A STUDY ON KNOWLEDGE AND ADOPTION OF TURMERIC FARMERS IN GUNTUR DISTRICT OF ANDHRA PRADESH

By

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B. Sc., (Ag.)

THESIS SUBMITTED TO THE
ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

MASTER OF SCIENCE IN AGRICULTURE

(AGRICULTURAL EXTENSION)

CHAIRPERSON: Dr. P. RAMBABU

DEPARTMENT OF AGRICULTURAL EXTENSION

AGRICULTURAL COLLEGE, BAPATLA-522 101

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
GUNTUR, ANDHRA PRADESH

2016

DECLARATION

I**, N. SUNDERA RAO,** hereby declare that the thesis entitled, **"A STUDY ON KNOWLEDGE AND ADOPTION OF TURMERIC FARMERS IN GUNTUR DISTRICT OF ANDHRA PRADESH"** submitted to **Acharya N. G. Ranga Agricultural University** for the degree of **Master of Science in Agriculture** is the result of original research work done by me. I also declare that no material contained in the thesis has been published earlier in any manner.

Date:

Place: **(N. SUNDERA RAO)**

CERTIFICATE

Mr. **N. SUNDERA RAO** has satisfactorily prosecuted the course of research and that the thesis entitled **"A STUDY ON KNOWLEDGE AND ADOPTION OF TURMERIC FARMERS IN GUNTUR DISTRICT OF ANDHRA PRADESH"** submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that neither the thesis nor its part thereof has been previously submitted by him for a degree of any university.

Date:

Place

(P. RAMBABU)
Chairperson
Professor & University Head
Department of Agricultural Extension
Agricultural College, Bapatla-522 101.

CERTIFICATE

This is to certify that the thesis entitled **"A STUDY ON KNOWLEDGE AND ADOPTION OF TURMERIC FARMERS IN GUNTUR DISTRICT OF ANDHRA PRADESH"** submitted in partial fulfilment of the requirements for the degree of **'MASTER SCIENCE IN AGRICULTURE'** of the Acharya N. G. Ranga Agricultural University, Guntur is a record of the bonafide original research work carried out by **Mr. N. SUNDERA RAO** under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance received during the course of the investigations have been duly acknowledged by the author of the thesis.

Thesis approved by the student's advisory committee

Chairperson : **Dr. P. RAMBABU** _____
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LIST OF CONTENTS

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I offer the humblest mark of respect & love at the lotus feet of my honored parents ***N. William David*** *&* ***Blandina****, and sister* ***Sowmya*** *who always been a light of energy & enthusiasm. Without whose constant ambitious encouragement, support, affection, sacrifice & blessings, I would not have come up to this stage.*

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While travelling on this part of education many hands pushed me forth, learned hearts put me on the right track. I ever rest thanks to all of them. Finally, I record my deep sincere thanks to all those who have helped me directly and indirectly to bring out this work in the present form

Finally, I frankly admit that it is not possible to remember all the faces that stood behind the facade at this juncture & omission of any names does not mean lack of gratitude.

Date:

Place: Bapatla (**N. SUNDERA RAO**)

APPENDIX - I

ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY

Dr. P. RAM BABU
Professor & university head

Department of Agricultural Extension
Agricultural College,
Bapatla.
Date:
Mobile No: 9866556634

Dear Sir / Madam,

I am glad to bring to your kind notice that a study entitled "A STUDY ON KNOWLEDGE AND ADOPTION OF TURMERIC FARMERS IN GUNTUR DISTRICT OF ANDHRA PRADESH" has been undertaken by Mr.N. Sundera Rao, pursuing M.Sc.(Ag) in the Department of Agricultural Extension, Agricultural college, Bapatla under my guidance. As a mandatory requirement of his proposed synopsis, he has planned to develop knowledge test " Knowledge of farmers about turmeric cultivation ".

The statements were prepared after thoroughly going through the available literature and in consultation with experts in all the fields of Agriculture (enclosed).

Considering your vast experience and knowledge in the field of agriculture, you have been selected as one of the experts for judging the statements.

I, therefore request you to spare your valuable time from your busy schedule and help the researcher by giving your valuable opinion on the **relevancy** of the statements for inclusion of the same in the final scale. My student Mr. N Sundera Rao will be contacting for collecting the copy judged.

Thanking you,

Yours Sincerely,

(**P. RAMBABU**)

Encl: List of knowledge statements

To

_____

_____

_____

_____

KNOWLEDGE TEST ITEMS PERTAINING TO SELECTED PRODUCTION TECHNOLOGY OF TURMERIC

The following are the knowledge statements which are intended to test the knowledge gained by the turmeric farmers. Against each statement you will find three response categories i.e., Most Relevant, Relevant and Least relevant. You are requested to give extent of agreement on each statement for inclusion in the final scale. Based on your responses the knowledge score will be calculated in order to select the statements for inclusion in the final knowledge test.

Please go through each statement carefully and record your response, (extent of agreement with each competency) by tick (Right) against the appropriate category of each statement. Please attempt all the statements. You are free to give valuable additions if possible.

S.NO	Statements	Most Relevant	Relevant	Less Relevant
1	India is the largest producer of Turmeric crop.			
2	In India, Andhra Pradesh is leading in Area and Production in turmeric cultivation.			
3	Allepy, Erode, Guntur, Cudappah, Sangi are the main markets for turmeric in India.			
4	Guntur, Cudappah and Nizamabad are main markets for turmeric in Andhra Pradesh.			
5	Temperature range preferable for turmeric cultivation is 20 to 32^0 C.			
6	Duggirala and Tekurpeta are long duration varieties.			
7	Sudarshan, Suguna, Kasturi are Short duration varieties.			
8	Kothapet, Krishna, Kesari, CLI 317 are Medium duration varieties.			
9	Varieties Kasturi and Kesari are good in curcumin content, but poorer in curing percentage.			
10	Short duration varieties of turmeric mature by 6-7 months.			
11	Medium duration varieties of turmeric mature by 8 months.			
12	Long duration varieties of turmeric mature by 9 months.			

13	Best time for sowing early maturing varieties is second fortnight of May.			
14	Best time for sowing medium duration varieties is first fortnight of June.			
15	Best time for sowing long duration varieties is after second fortnight of June.			
16	Decrease in yield is noticed when sowing is done after second fortnight of July.			
17	Best suitable soils for turmeric cultivation are well drained sandy and clay loam.			
18	Turmeric crop cannot withstand water logging and alkaline conditions.			
19	Whole rhizomes, cut mothers, primary fingers are used as planting materials.			
20	Seedlings can be raised in protrays by using budchip method.			
21	Seed rate can be reduced upto $1/3^{rd}$ using protray method of raising seedlings.			
22	Using primary fingers as planting material are preferred more since they give more yields.			
23	Finger rhizomes are more tolerant to wet soil and involve low seed rate.			
24	Soil is brought to fine tilth of 20-25 cm depth by giving about 6-8 deep ploughings.			
25	10 tonnes of FYM should be added during ploughing.			
26	Seed treatment is done with Ridomil @ 3 gms/lit of water for 40 minutes before sowing.			
27	Seed treatment is done with malathion @ 2-5 ml/lit of water to control scales infection should.			
28	Seed treatment with Trichoderma viride @ 5 gm/liter water should be done.			
29	The optimum seed rate recommended when mother rhizomes are used for one acre is 1000 kgs.			
30	The optimum seed rate recommended when fingers are used as for one acre is 600 kgs.			
31	Spacing of 30 × 15 cm is followed in raised seed bed type sowing.			
32	The optimum spacing in ridges and furrows method is 45-60 cm between the rows and 20			

	cm between the plants.			
33	The best method of planting in low lying areas and black soils is raised bed method.			
34	Germination starts in 10-20 days and completed by 60 days.			
35	Turmeric crop can be grown as an intercrop in banana plantations.			
36	Turmeric crop can be raised as a mixed crop with chillies, brinjal and cereals like maize, ragi, etc			
37	In turmeric, crop rotation with chillies and vegetables is followed.			
38	Turmeric as a best component crop in agri-horti and silvi-horti systems.			
39	Herbicide pendimethalin should be sprayed @ 1 lit /acre water next day after sowing.			
40	Weed free conditions should be maintained upto 40-45 DAS.			
41	A country plough is worked in between rows to control weed growth and facilitate earthing up.			
42	Weeding has to be done thrice at 60, 90 and 120 days after planting.			
43	75 kg of nitrogen fertilizer is recommended dosage for turmeric			
44	24 kg of phosphorus fertilizer is applied at the time of sowing.			
45	50 kg of potassium fertilizer is recommended dosage in turmeric.			
46	Nitrogen is applied at the time of sowing, 40, 80 and 120 DAS			
47	Potassium is applied at the time of sowing, 80 and 120 DAS.			
48	200 kg of neem cake is applied in last plough.			
49	Zinc sulphate of 20 kg / acre should be added to soil during land preparation.			
50	Iron deficiency can be cured by spraying ferrous sulphate @ 5 gm/ lit water.			
51	Potassium deficiency can be cured by spraying potassium nitrate @10 gm/lit of water.			
52	After applying fertilizers, the field is given a light hoeing and the clumps are earthed up and irrigated.			

53	A good soaking irrigation is given immediately after sowing.			
54	If drip system is used for irrigation the laterals spaced at 1 meter distance and emitters at 60 cm distance.			
55	By using drip system, fertigation practice can be followed.			
56	Turmeric crop can be grown in heavy soils with 15- 20 irrigations.			
57	When rhizome rot is observed in field, gap between two irrigations should be increased.			
58	The crop should be mulched immediately after planting with green leaves @ 10-12 tonnes/ha.			
59	Mulching may be repeated after weeding and at 40 and 90 DAS.			
60	Collar region of the pseudostem becomes soft resulting in collapse of the plant and decay of rhizomes is the symptom of rhizome rot.			
61	To manage rhizome rot, drench the soil at root region with Ridomil MZ 72 @ 2.5g/l in the initial stages of the disease.			
62	Rhizome rot incidence is less in when irrigated with drip system.			
63	Placing of neem cake at collar region of plants can effectively control the rhizome rot and fly			
64	PCT-13 (Sudarshan) and PCT-14 (Suguna) are Varieties resistant to rhizome rot			
65	Brown spots of various sizes on the upper surface of the young leaves is a symptom of leaf spot.			
66	Leaf spot can be controlled by spraying @ 2.5 gm/lit water of mancozeb @ 1 gm/lit water of carbendazim.			
67	leaf spot disease is seen from month September.			
68	Long duration varieties like Duggirala, Mydukur, Tekurpet are susceptible to leaf spot			
69	Small, oval, rectangular or irregular brown spots on either side of the leaves is a symptom of leaf blotch.			

70	Turmeric leaf blotch can be controlled by spraying Carbendazim @ 1 gm/lit water or Propiconazole @ 1ml /lit water.			
71	Occurrence of leaf blotch is seen during the months of November and December.			
72	The rhizome scale (*Aspidiella hartii*) infests both in field and in storage.			
73	Rhizome scale can be controlled by soaking seed rhizome in 5 ml Malathion in 1 lit of water.			
74	Rhizome fly infestation cause dead hearts, Wilting and drying of aerial plants.			
75	Infestation of rhizome fly is seen from October to till harvest.			
76	Rhizome fly can be controlled by spraying profenophos @ 2 ml/lit water.			
77	Root knot nematodes (*Meloidogyne* spp.) and burrowing nematode (*Radopholus similis*) are the two important nematodes causing damage to turmeric.			
78	Increasing the organic content of the soil also checks the multiplication of nematodes.			
79	Maturity indication for turmeric crop is complete yellowing and drying up of plants			
80	Main season of harvesting falls in February – April.			
81	The land is ploughed and the rhizomes are collected by hand picking or the clumps are carefully lifted with a spade.			
82	The average yield of turmeric in India is 20 tonnes per ha			
83	Mother rhizomes obtained after harvesting are usually kept as seed material.			
84	Curing involves boiling of fresh rhizomes in water and drying in the sun.			
85	Turmeric should be boiled within 2 to 7 days after harvesting.			
86	Mother rhizomes and fingers should be boiled separately, since fingers take long time for boiling.			
87	The optimum time period required for complete boiling of rhizomes is 45-60 minutes.			

88	when froth comes out and white fumes appear, giving out a typical odour is indication for complete boiling.			
89	By using steam boilers more curcumin content can be restored.			
90	Over cooking spoils the colour of the final product while under-cooking renders the dried product brittle.			
91	In the improved scientific method of curing, the cleaned fingers (approximately 50 kg) are taken in a perforated trough of 90 cm x 50 cm x 40 cm size made of Galvanized iron or mild steel sheet			
92	The cooked fingers are dried in the sun by spreading them in three inches thick layers on bamboo mats or drying cement floor.			
93	10-15 days are required to complete drying of boiled rhizomes			
94	Well dried rhizome gives metallic sound when broken.			
95	Artificial drying has clear advantage in giving a brighter coloured product than sun drying.			
96	Aflotoxins may produce if boiled rhizomes are not properly dried			
97	The yield of the dry product varies from 10-30 per cent depending upon the variety and the location where the crop is grown.			
98	The moisture content in the properly dried rhizome is 8%.			
99	Dried turmeric has a poor appearance and a rough dull outer surface with scales and root bits.			
100	The appearance dried product is improved by smoothening and polishing the outer surface.			
101	Manual polishing consists of rubbing the dried turmeric fingers on a hard surface.			
102	The improved method of polishing is done by using a hand operated barrel or drum.			
103	The yield of polished turmeric varies from 15-25 per cent from the raw material.			
104	The colour of the processed turmeric influences the price of the produce.			

105	For an attractive product, turmeric powder (mixed with little water) may be sprinkled during the last phase of polishing.			
106	Rhizomes for seed purpose are generally stored by heaping under shade of trees or in well ventilated rooms and covered with clean turmeric leaves.			
107	For storage of dried turmeric, clean gunny bags with inner polythene layer should be used.			
108	Gunny bags used for rhizome storage should be sprayed with malathion @ 10 ml / lit.			
109	The seed rhizomes can be stored in pits with saw dust and plastered with mix of red soil and dung.			
110	Rhizomes with 4 percent curcumin content are used to export.			

Appendix -II

S.No	Statement	Mean Score
1	India is the largest producer of Turmeric crop.	1.95
2	In India, Andhra Pradesh is leading in Area and Production in turmeric cultivation.	1.92
3	Allepy, Erode, Guntur, Cudappah, Sangi are the main markets for turmeric in India.	1.91
4	Duggirala, Cudappah and Nizamabad are main markets for turmeric in Andhra Pradesh.	1.98
5	Temperature range preferable for turmeric cultivation is 20 to 32^0 C.	1.95
6	Duggirala, salem and Tekurpeta are long duration varieties.	2.24*
7	Sudarshan, Suguna, Kasturi are Short duration varieties.	1.9
8	Kothapet, Krishna, Kesari, CLI 317 are Medium duration varieties.	1.8
9	Varieties Kasturi and Kesari are good in curcumin content, but poorer in curing percentage.	1.96
10	Short duration varieties of turmeric mature by 6-7 months.	1.95
11	Medium duration varieties of turmeric mature by 8 months.	1.93
12	Long duration varieties of turmeric mature by 9 months.	2.02*
13	Best time for sowing early maturing varieties is second fortnight of May.	1.95
14	Best time for sowing medium duration varieties is first fortnight of June.	1.95
15	Best time for sowing long duration varieties is after second fortnight of June.	2.6*
16	Decrease in yield is noticed when sowing is done after second fortnight of July.	2.61*

17	Best suitable soils for turmeric cultivation are well drained sandy and clay loam.	1.85
18	Turmeric crop cannot withstand water logging and alkaline conditions.	1.75
19	Whole rhizomes, cut mothers, primary fingers are used as planting materials.	2.00
20	Seedlings can be raised in protrays by using budchip method.	2.01
21	Seed rate can be reduced upto 1/3rd using protray method of raising seedlings.	1.8
22	High yields obtained When primary fingers with weight of 30-40 grms used as planting material.	1.95
23	Finger rhizomes are more tolerant to wet soil and involve low seed rate.	1.95
24	Soil is brought to fine tilth of 20-25 cm depth by giving about 6-8 deep ploughings.	1.95
25	10 tonnes of FYM should be added during ploughing.	1.85
26	Seed rhizomes are soaked in Ridomil @ 3 gms/lit of water for 40 minutes before sowing.	2.21*
27	Seed treatment is done with malathion @ 2-5 ml/lit of water to control scales infection.	2.4*
28	Seed treatment with Trichoderma viride @ 5 gm/liter water should be done immediately before sowing.	1.63
29	The optimum seed rate recommended when seed rhizomes are used for one acre is 1000 kgs.	2.6*
30	The optimum seed rate recommended when fingers are used as for one acre is 600 kgs.	1.95
31	Spacing of 30 × 15 cm is followed in raised seed bed type sowing.	2.15*
32	The optimum spacing in ridges and furrows method is 45-60 cm between the rows and 20 cm between the plants.	2.1 *

33	The best method of planting in low lying areas and black soils is raised bed method.	1.95
34	Germination starts in 10-20 days and completed by 45 days.	2.22*
35	Turmeric crop can be grown as an intercrop in banana plantations.	1.95
36	Turmeric crop can be raised as a mixed crop with chillies, brinjal and cereals like maize, ragi, etc	1.95
37	In turmeric, crop rotation with chillies and vegetables is followed.	2.00
38	Turmeric as a best component crop in agri-horti and silvi-horti systems.	1.75
39	Herbicide pendimethalin should be sprayed @ 1 lit /acre water next day after sowing.	2.02
40	Weed free conditions should be maintained upto 120 DAS.	1.47
41	A country plough is worked in between rows to control weed growth and facilitate earthing up.	1.95
42	Weeding has to be done thrice at 60, 90 and 120 days after planting.	1.83
43	75 kg of nitrogen fertilizer is recommended dosage for turmeric	2.3*
44	24 kg of phosphorus fertilizer is applied at the time of sowing.	2.3*
45	50 kg of potassium fertilizer is recommended dosage in turmeric.	2.3*
46	Nitrogen is applied at the time of sowing, 40, 80 and 120 DAS	2.25*
47	Potassium is applied at the time of sowing, 80 and 120 DAS.	2.2*
48	200 kg of neem cake is applied in last plough.	2.31*
49	Zinc sulphate of 20 kg / acre should be added to soil during land preparation.	2.17*

50	Iron deficiency can be cured by spraying ferrous sulphate @ 5 gm/ lit water.	2.15*
51	Potassium deficiency can be cured by spraying potassium nitrate @10 gm/lit of water.	1.95
52	After applying fertilizers, the field is given a light hoeing and the clumps are earthed up and irrigated.	2.00
53	A good soaking irrigation is given immediately after sowing.	1.95
54	If drip system is used for irrigation the laterals spaced at 1 meter distance and emitters at 60 cm distance.	2.3*
55	By using drip system, fertigation practice can be followed.	1.94
56	Turmeric crop can be grown in heavy soils with 15- 20 irrigations.	1.95
57	The crop should be mulched immediately after planting with green leaves @ 10-12 tonnes/ha.	1.9
58	Mulching may be repeated after weeding and at 40 and 90 DAS.	1.95
59	Collar region of the pseudostem becomes soft resulting in collapse of the plant and decay of rhizomes is the symptom of rhizome rot.	2.27*
60	To manage rhizome rot, drench the soil at root region with Ridomil MZ 72 @ 2.5g/l in the initial stages of the disease.	2.1
61	When rhizome rot is observed in field, gap between two irrigations should be increased.	2.29*
62	Rhizome rot incidence is less in when irrigated with drip system	2.04 *
63	Placing of neem cake at collar region of plants can effectively control the rhizome rot and fly	2.35*
64	PCT-13 (Sudarshan) and PCT-14 (Suguna) are Varieties resistant to rhizome rot	1.95
65	Brown spots of various sizes on the upper surface of the young leaves is a symptom of leaf spot.	2.25*

66	Leaf spot can be controlled by spraying @ 2.5 gm/lit water of mancozeb @ 1 gm/lit water of carbendazim.	2.45*
67	leaf spot disease is seen from month September.	1.91
68	Long duration varieties like Duggirala, Mydukur, Tekurpet are susceptible to leaf spot	2.45*
69	Small, oval, rectangular or irregular brown spots on either side of the leaves is a symptom of leaf blotch.	1.67
70	Turmeric leaf blotch can be controlled by spraying Carbendazim @ 1 gm/lit water or Propiconazole @ 1ml /lit water.	2.49*
71	Occurrence of leaf blotch is seen during the months of November and December.	1.95
72	The rhizome scale (*Aspidiella hartii*) infests both in field and in storage.	1.57
73	Rhizome scale can be controlled by soaking seed rhizome in 5 ml Malathion in 1 lit of water.	1.95
74	Rhizome fly infestation cause dead hearts, Wilting and drying of aerial plants.	1.55*
75	Infestation of rhizome fly is seen from October to till harvest.	1.8
76	Rhizome fly can be controlled by application of neem cake and in severe case carbofuran 3G @ 10 kg/acre.	2.25*
77	Root knot nematodes (*Meloidogyne* spp.) and burrowing nematode (*Radopholus similis*) are the two important nematodes causing damage to turmeric.	1.95
78	Increasing the organic content of the soil also checks the multiplication of nematodes.	1.9
79	Maturity indication for turmeric crop is complete yellowing and drying up of plants	2.05*
80	Main season of harvesting falls in February – April.	2.48*
81	The land is ploughed and the rhizomes are collected by hand picking or the clumps are carefully lifted with a spade.	1.9

82	The average yield of turmeric in India is 20 tonnes per ha	1.9
83	Mother rhizomes obtained after harvesting are usually kept as seed material.	2.49*
84	Curing involves boiling of fresh rhizomes in water and drying in the sun.	1.9
85	Turmeric should be boiled within 2 to 7 days after harvesting.	2.35 *
86	Mother rhizomes and fingers should be boiled separately, since fingers take long time for boiling.	2.16 *
87	The optimum time period required for complete boiling of rhizomes is 45-60 minutes.	2.47*
88	When froth comes out and white fumes appear, giving out a typical odour is indication for complete boiling.	2.09*
89	By using steam boilers more curcumin content can be restored.	1.80
90	Over cooking spoils the colour of the final product while under-cooking renders the dried product brittle.	1.85
91	In the improved scientific method of curing, the cleaned fingers (approximately 50 kg) are taken in a perforated trough of 90 cm x 50 cm x 40 cm size made of Galvanized iron or mild steel sheet	1.3
92	The cooked fingers are dried in the sun by spreading them in three inches thick layers on bamboo mats or drying cement floor.	1.95
93	10-15 days are required to complete drying of boiled rhizomes	2.06 *
94	Well dried rhizome gives metallic sound when broken.	1.25
95	Artificial drying has clear advantage in giving a brighter coloured product than sun drying.	1.95

96	Aflotoxins may produce if boiled rhizomes are not properly dried	2.51*
97	The yield of the dry product varies from 10-30 per cent depending upon the variety and the location where the crop is grown.	1.95
98	The moisture content in the properly dried rhizome is 8%.	1.95
99	Dried turmeric has a poor appearance and a rough dull outer surface with scales and root bits.	2.01
100	The appearance of dried product is improved by smoothening and polishing the outer surface.	1.95
101	Manual polishing consists of rubbing the dried turmeric fingers on a hard surface.	2.03
102	The improved method of polishing is done by using a hand operated barrel or drum.	1.95
103	The colour of the processed turmeric influences the price of the produce.	2.03
104	For an attractive product, turmeric powder (mixed with little water) may be sprinkled during the last phase of polishing.	2.44 *
105	Rhizomes for seed purpose are generally stored by heaping under shade of trees or in well ventilated rooms and covered with clean turmeric leaves.	1.7
106	For storage of dried turmeric, clean gunny bags with inner polythene layer should be used.	1.95
107	Gunny bags used for rhizome storage should be sprayed with malathion @ 10 ml / lit.	1.95
108	The seed rhizomes can be stored in pits with saw dust and plastered with mix of red soil and dung.	2.00
109	The seed rhizomes should not be stored under direct sun light.	1.8
110	Rhizomes with 4 percent curcumin content are used to export.	2.39*

Appendix -III

The following are the knowledge statements which are intended to test the knowledge

Item no	Frequency of correct answers in the groups G1, G2, G5, G6				Difiiculty Index	Discrimination Index	Point Biserial Correlation	't' Values
	S1	S2	S5	S6				
1.	7	10	3	7	65	0.35	0.11946691	0.916395959 NS
2.	9	9	3	4	62	0.55	0.25514122	2.009608047*
3.	6	4	6	3	43	0.05	0.07845285	0.599326309 NS
4.	7	6	7	5	68	0.05	0.06249582	0.476886211 NS
5.	8	2	1	0	23	0.45	0.25634211	2.019730347*
6.	10	10	9	5	88	0.3	0.36380312	2.974464616**
7.	8	7	2	1	32	0.5	0.25081868	1.973255044 NS
8.	8	6	3	2	40	0.45	0.22439256	1.75364278 NS
9.	8	10	4	5	67	0.45	0.20045167	1.558220758 NS
10.	7	7	0	0	31	0.5	0.25081868	1.973255044 NS
11.	8	6	1	1	32	0.6	0.27799386	2.204014146*
12.	8	5	2	0	28	0.55	0.27904064	2.213012633*
13.	8	8	2	1	48	0.65	0.29085679	2.315192951*
14.	10	8	0	0	35	0.9	0.40614668	3.384870041**
15.	10	10	9	7	93	0.2	0.33205352	2.680960506**
16.	7	9	4	5	67	0.35	0.18431608	1.42817839 NS
17.	9	9	3	2	58	0.65	0.31899792	2.563336179*
18.	10	10	9	8	92	0.15	0.21594154	1.684300703NS
19.	8	7	2	2	38	0.55	0.26619055	2.103126762*
20.	8	0	0	0	35	0.4	0.2458515	1.931635934 NS
21.	7	10	5	4	72	0.4	0.23371126	1.830588113 NS
22.	9	10	9	8	92	0.1	0.07985983	0.610143109 NS
23.	9	5	8	8	73	-0.1	0.01755029	0.133679632 NS
24.	10	10	8	4	85	0.4	0.37619851	3.092198168**
25.	10	10	1	0	60	0.95	0.47006634	4.055962554**
26.	5	0	0	0	17	0.25	0.23162878	1.813347604 NS
27.	10	10	6	4	82	0.5	0.34555966	2.804468211**
28.	10	8	6	6	75	0.3	0.17063309	1.318844228 NS
29.	10	7	2	0	58	0.75	0.40088054	3.332511929**
30.	9	2	1	1	27	0.45	0.27396632	2.169470875*
31.	10	8	7	8	82	0.15	0.16648245	1.285837155 NS
32.	10	10	9	8	95	0.15	0.2994215	2.389976077*
33.	7	7	9	6	72	-0.05	-0.00137	-0.010433924 NS
34.	5	2	1	0	22	0.3	0.13842285	1.064444224 NS
35.	4	8	8	6	68	-0.1	-0.0909902	-0.695847178 NS
36.	10	9	4	7	72	0.4	0.21955888	1.713931864 NS
37.	8	8	7	2	65	0.35	0.18415178	1.426860615 NS
38.	9	7	5	2	63	0.42	0.18809969	1.461076445 NS
39.	10	10	8	6	88	0.3	0.31209415	2.501800216*

40.	8	8	6	4	68	0.3	0.11512547	0.882638183 NS
41.	9	10	0	0	45	0.95	0.41887434	3.513102009**
42.	10	10	8	6	87	0.3	0.28634166	2.276015387*
43.	9	8	7	1	63	0.45	0.38431554	3.170330637**
44.	8	8	5	5	67	0.3	0.32858215	2.649519346**
45.	8	5	9	9	78	-0.25	-0.1031262	-0.789596005 NS
46.	7	8	2	1	35	0.6	0.25120547	1.976502863*
47.	10	9	8	5	85	0.3	0.30809292	2.466337605*
48.	9	9	0	0	52	0.9	0.41092731	3.432750519**
49.	9	9	0	0	40	0.9	0.369869	3.03184494**
50.	10	10	8	5	33	0.5	0.25081868	1.973255044 NS
51.	10	10	10	10	92	0	-0.0363185	-0.276775956 NS
52.	8	2	3	0	32	0.35	0.20334557	1.581679723 NS
53.	9	8	5	6	68	0.3	0.36262433	2.963364246**
54.	8	2	0	0	23	0.5	0.25460694	2.005107728*
55.	3	1	1	2	20	0.05	0.06766398	0.516497255 NS
56.	6	3	2	0	27	0.35	0.17753869	1.373920753 NS
57.	5	4	1	1	27	0.35	0.19603833	1.52252616 NS
58.	10	10	10	8	97	0.1	0.28507895	2.265088625*
59.	6	5	6	2	53	0.15	0.06975747	0.532554363NS
60.	8	5	2	0	48	0.55	0.31695963	2.545121568*
61.	7	8	2	1	35	0.6	0.25120547	1.976502863*
62.	10	10	9	7	93	0.2	0.33205352	2.680960506**
63.	8	8	5	6	60	0.25	0.30088164	2.40278748*
64.	6	6	1	1	33	0.5	0.25081868	1.973255044 NS
65.	8	8	3	7	70	0.3	0.39211787	3.24624872**
66.	10	8	7	6	74	0.31	0.17052204	1.307856645 NS
67.	8	2	1	0	23	0.45	0.25634211	2.019730347*
68.	6	9	5	3	57	0.35	0.26394149	2.084020227*
69.	8	5	0	0	28	0.65	0.32886533	2.652080922**
70.	10	10	9	7	92	0.2	0.29352504	2.338424435*
71.	7	10	3	7	65	0.35	0.11946691	0.916395959 NS
72.	7	6	7	5	68	0.05	0.06249582	0.476886211 NS
73.	6	4	6	3	43	0.05	0.07845285	0.599326309 NS
74.	9	9	3	4	62	0.55	0.25514122	2.009608047*
75.	8	9	4	8	35	0.59	0.25081868	1.955255044 NS
75	10	10	9	5	88	0.3	0.36380312	2.974464616**
76	8	10	9	10	88	-0.05	-0.068469	-0.522670587 NS
77	10	9	4	6	62	0.45	0.19517912	1.515588249NS
78	8	6	3	2	40	0.45	0.22439256	1.75364278 NS
79	10	10	9	8	95	0.15	0.2994215	2.389976077*
80	9	2	1	1	27	0.45	0.27396632	2.169470875*
81	8	6	1	1	32	0.6	0.27799386	2.204014146*
82	8	5	2	0	28	0.55	0.27904064	2.213012633*
83	8	8	2	1	48	0.65	0.29085679	2.315192951*
84	7	9	4	5	67	0.35	0.18431608	1.42817839 NS
85	10	8	0	0	35	0.9	0.40614668	3.384870041**
86	8	5	0	0	28	0.65	0.32886533	2.652080922**
87	9	9	3	2	58	0.65	0.31899792	2.563336179*
88	10	10	9	8	92	0.15	0.21594154	1.684300703NS

89	8	7	2	2	38	0.55	0.26619055	2.103126762*
90	8	0	0	0	35	0.4	0.2458515	1.931635934 NS
91	10	10	1	0	60	0.95	0.47006634	4.055962554**
92	10	10	8	4	85	0.4	0.37619851	3.092198168**
93	9	10	9	8	92	0.1	0.07985983	0.610143109 NS
94	9	9	0	0	52	0.9	0.41092731	3.432750519**
95	8	7	2	1	32	0.5	0.25081868	1.973255044 NS
96	7	10	5	4	72	0.4	0.23371126	1.830588113 NS
97	5	0	0	0	17	0.25	0.23162878	1.813347604 NS
98	10	10	6	4	82	0.5	0.34555966	2.804468211**
99	9	9	0	0	40	0.9	0.369869	3.03184494**
100	10	7	2	0	58	0.75	0.40088054	3.332511929**
101	7	7	0	0	31	0.5	0.25081868	1.973255044 NS
102	10	8	7	8	82	0.15	0.16648245	1.285837155 NS
103	8	10	4	5	67	0.45	0.20045167	1.558220758 NS
104	7	7	9	6	72	-0.05	-0.00137	-0.010433924 NS
105	8	8	5	5	67	0.3	0.32858215	2.649519346**
106	4	8	8	6	68	-0.1	-0.0909902	-0.695847178 NS
107	10	10	8	6	87	0.3	0.28634166	2.276015387*
108	8	8	7	2	65	0.35	0.18415178	1.426860615 NS
109	9	7	5	2	63	0.42	0.18809969	1.461076445 NS
110	8	10	4	5	67	0.45	0.20045167	1.558220758 NS

* Items selected final knowledge test (Mean score = > 2.03)

APPENDIX - IV

LEVEL OF KNOWLEDGE OF FARMERS ON THE SELECTED PRODUCTION

1. The turmeric varietie Duggirala, salem and tekurpet are the ( )
   a) long duration varieties b) short duration varieties
   c) medium duration varieties d) semi medium duration varieties

2. Long duration varieties of turmeric mature by. ( )
   a) 7 months b) 8 months c) 9 months d) 10 months

3. For export of the turmeric the Curcumin content should be. ( )
   a) 4 % b) 5.5% c) 9% d) 13%

4. Best time for sowing of long duration varieties is in. ( )
   a) First fortnight of May c) First fortnight of June
   b) second fortnight of June d) second fortnight of august.

5. In last ploughing the amount of FYM should be added is ( )
   a) 10 tonnes b) 5 tonnes c) 25 tonnes d) 20 tonnes

6. Seed rhizomes are soaked in Ridomil @ 3 gms/lit, before sowing for time period of.

   a) 10 minutes b) 20 minutes c) 60 minutes d) 40 minutes ( )

7. The optimum seed rate recommended for seed rhizomes for one acre is. ( )
   a) 500 kgs. b) 1000 kgs. c) 1500 kgs. d) 2000 kgs.

8. The optimum spacing turmeric of in ridges and furrows method is. ( )
   a) 45 × 20 cm b) 55 × 30 cm c)20 × 20 cm d) 30 × 30 cm

9. Rhizome fly infestation will cause. ( )
   a) Dead hearts b) wilting c) drying d) all the above

10. The germination process in Turmeric completes by. ( )
    a) 20 DAS b) 30 DAS c) 35 DAS d) 45 DAS

11. The dosage of pendimethalin which has to be be sprayed for control of weeds/ acre is.
    a) @ 1 lit /acre b) @ 2 lit /acre c) @ 3 lit /acre d) @ 0.5 lit /acre ( )

B. Please fill in the blanks with appropriate words.

12. The recommended dosage of Urea fertilizer is dosage for turmeric _____ .
13. The recommended dosage of SSP fertilizer in turmeric is _____ .
14. The recommended dosage of MOP fertilizer in turmeric is _____
15. Collar region of the pseudostem becomes soft resulting in collapse of the plant and decay of rhizomes is the symptom of _____.
16. Within how many days the harvested rhizomes should be boiled. _____
17. What is the characteristic symptom of completely boiled rhizomes. _____
18. Which disease attacks when boiled rhizomes are not properly boiled _____
19. During last stage of polishing which solution mixture is sprayed over rhizomes_____

C. Please indicate your answer by underlining True/False for the following statements.

20.* The optimum time period required for complete boiling of rhizomes is 20 mins. **True/False**

21. Nitrogen fertilizerts should applied at the time of sowing, 40, 80 and 120 DAS **True/False**
22. Turmeric leaf blotch can be controlled by spraying carbendizim @ 1ml /lit water. **True/False**
23. Decrease in yield is noticed when sowing is done after second fortnight of July. **True/False**
24. If drip system is used for irrigation the laterals spaced at 1 meter distance and emitters at 60 cm distance. **True/False**
25.* Iron deficiency can be corrected by spraying ferrous sulphate @ 15 gm/ lit. **True/False**
26.* When rhizome rot is observed in field, gap between two irrigations should be decrease. **True/False**
27. Brown spots of various sizes on the upper surface of the young leaves is a symptom of leaf spot. **True/False**

D. Please indicate your answer by underlining Yes/No for the following statements.

28. Zinc sulphate should be added to soil during land preparation. **Yes/No**
29. Turmeric crop can be grown in heavy soils with 15- 20 irrigations. **Yes/No**
30*. Main season of harvesting falls in May – July. **Yes/No**
31. Placing of neem cake at collar region of plants can control the Leaf Spot and Blotch. **Yes/No**
32*. Rhizome rot incidence is more in when irrigated with drip system. **Yes/No**
33*. Rhizome fly can be controlled by application of carbofuran granules. **Yes/No**
34. Crop rotation was compulsory practice in turmeric cultivation. **Yes/No**

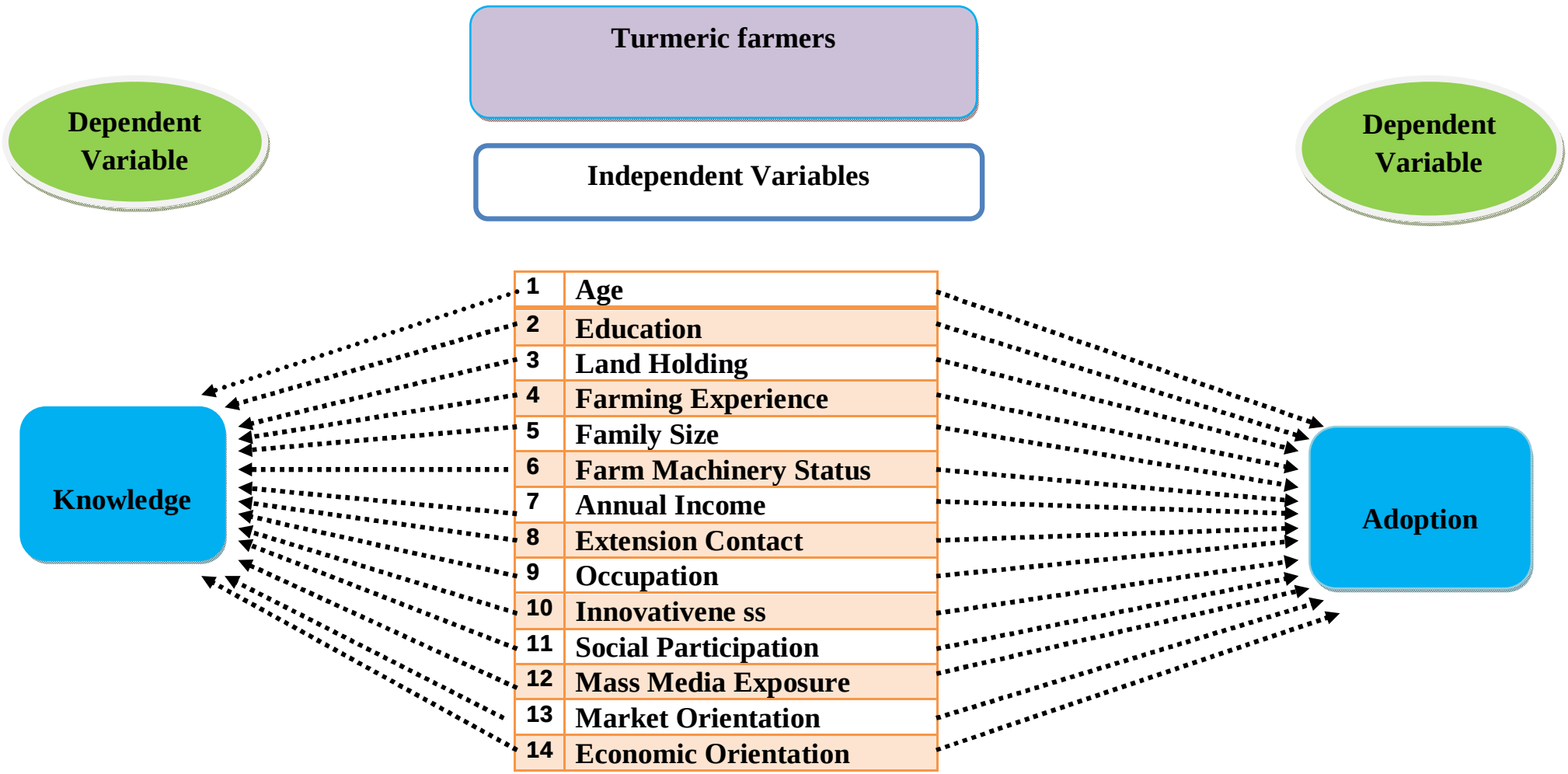

Fig. 2.1 Conceptual model of the study

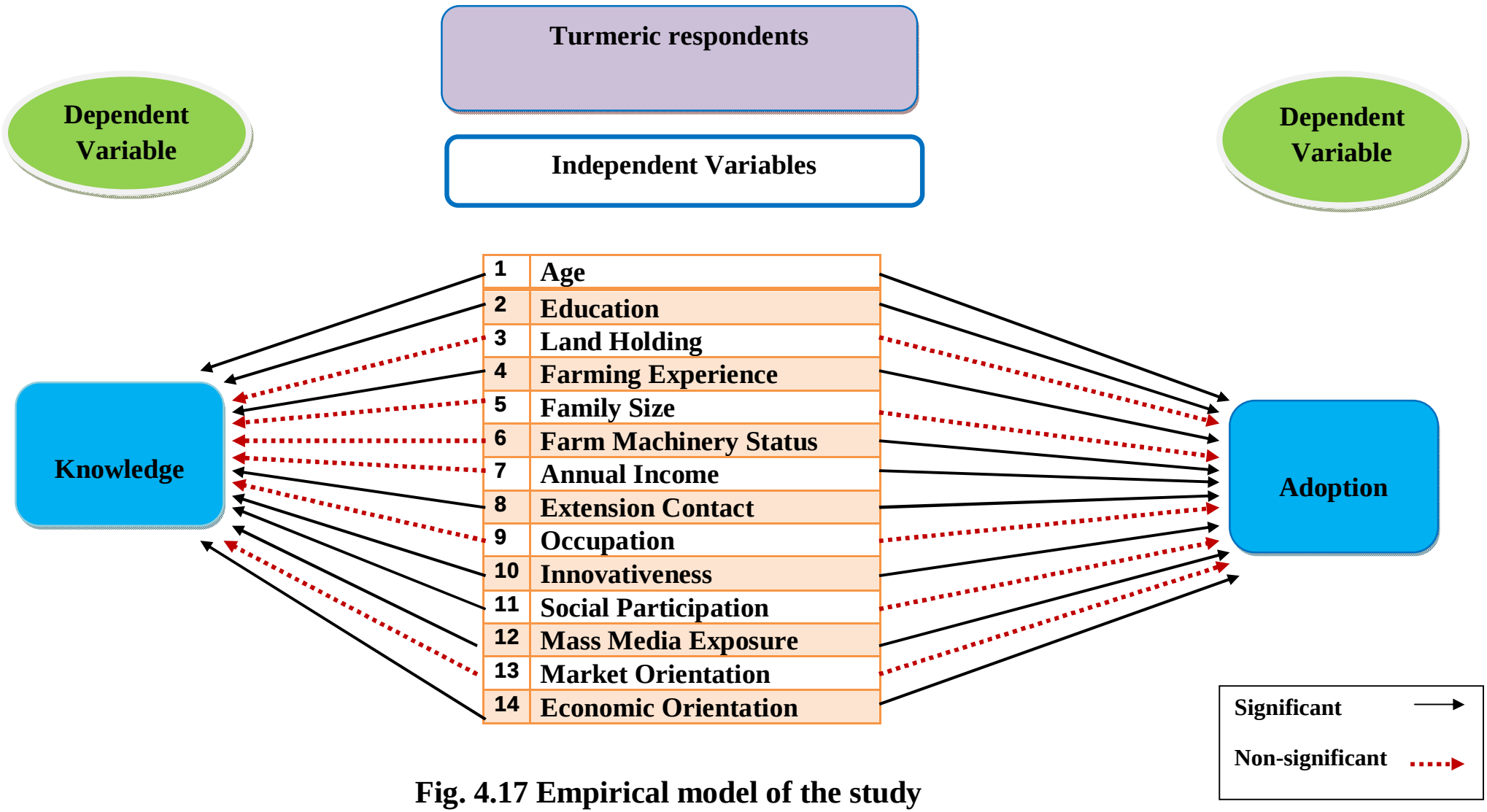

Fig. 4.17 Empirical model of the study

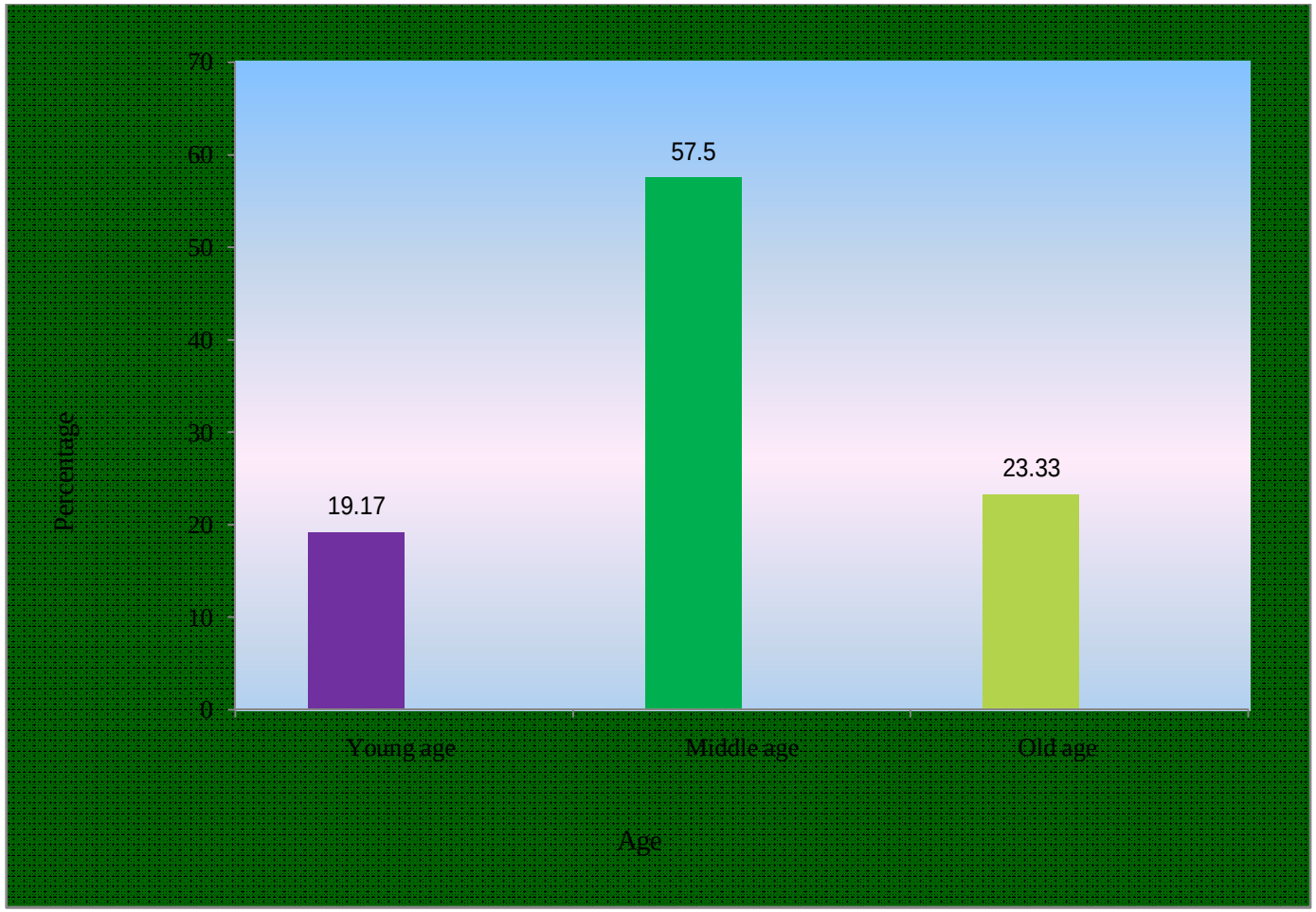

Fig. 4.1 Distribution of respondents according to their age

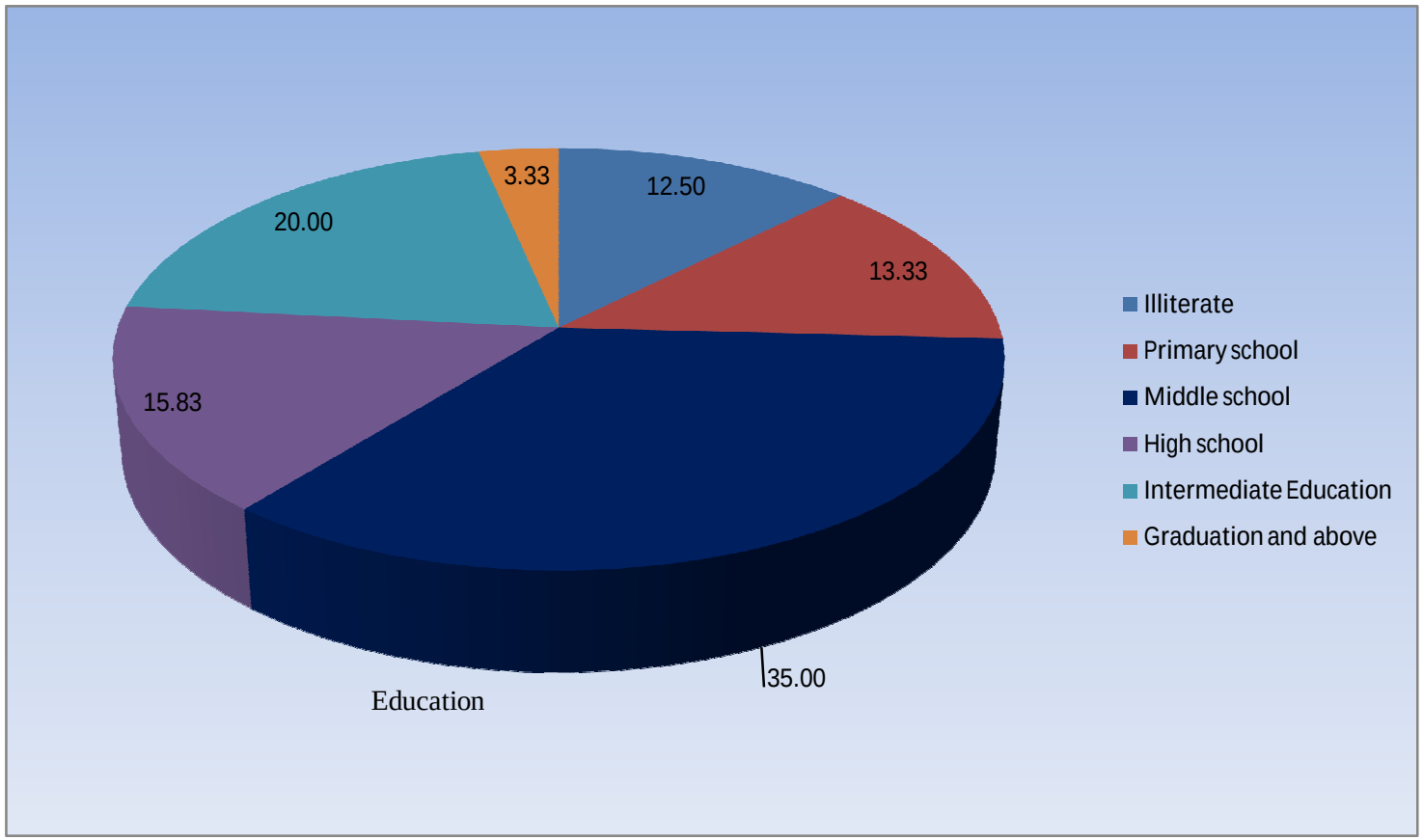

Fig. 4.2 Distribution of respondents according to their education

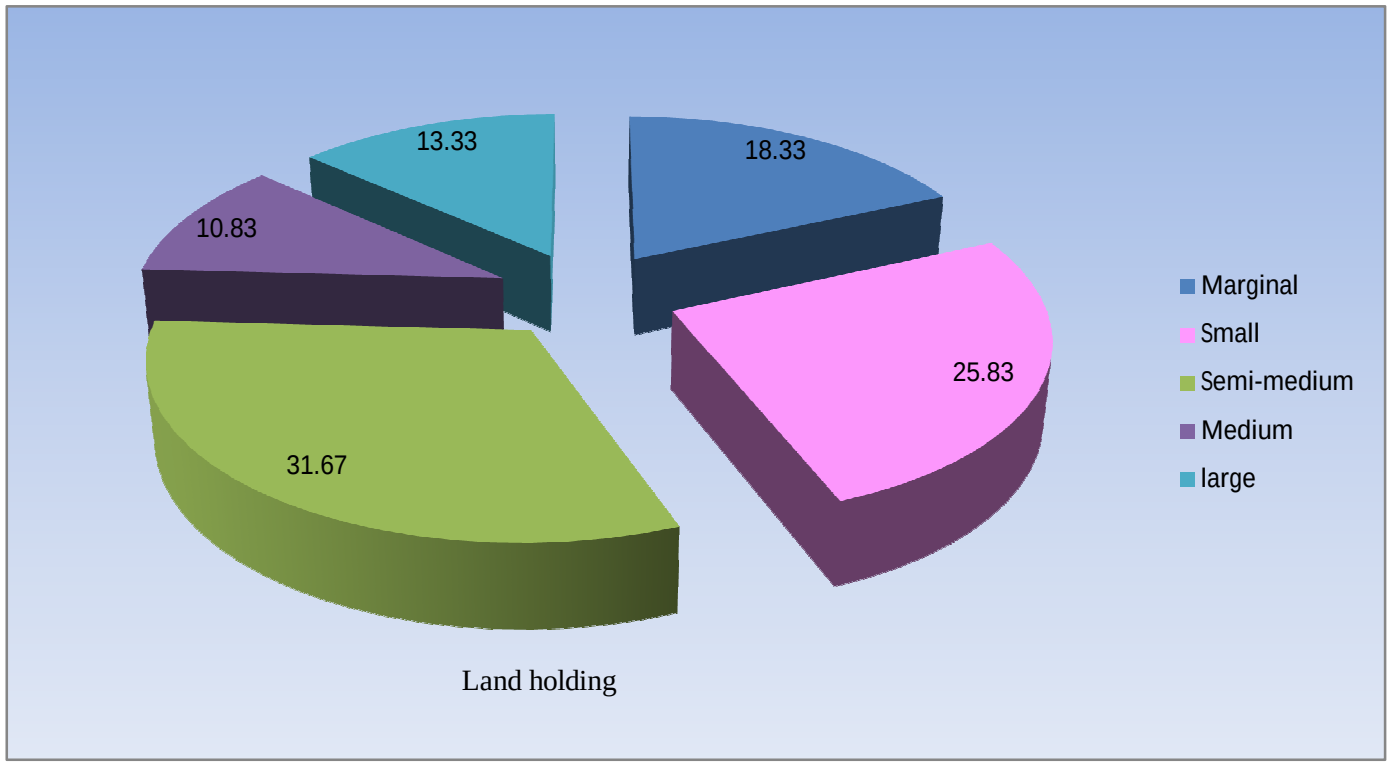

Fig. 4.3 Distribution of respondents according to their land holding

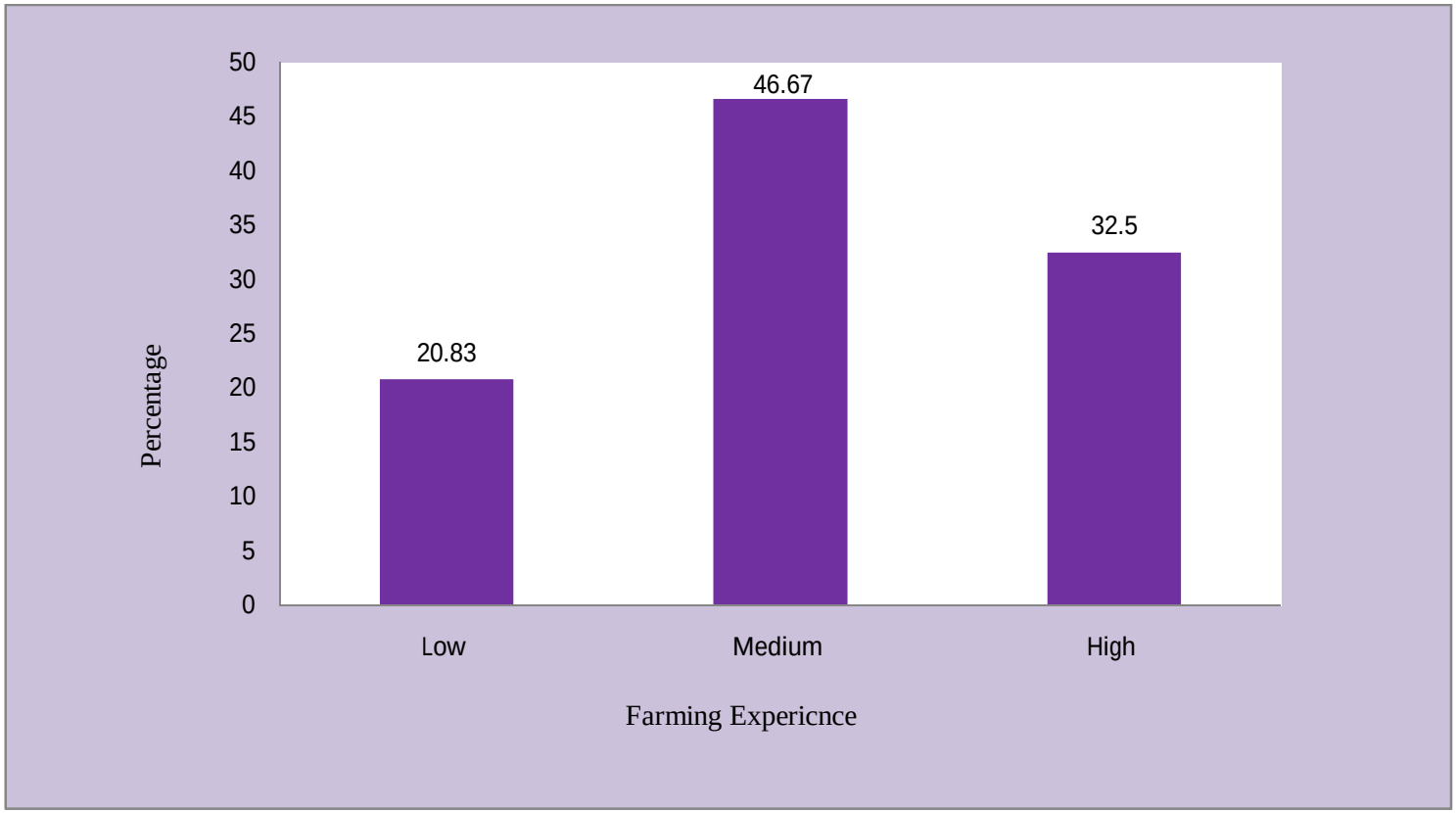

Fig. 4.4 Distribution of respondents according to their Farming Experience

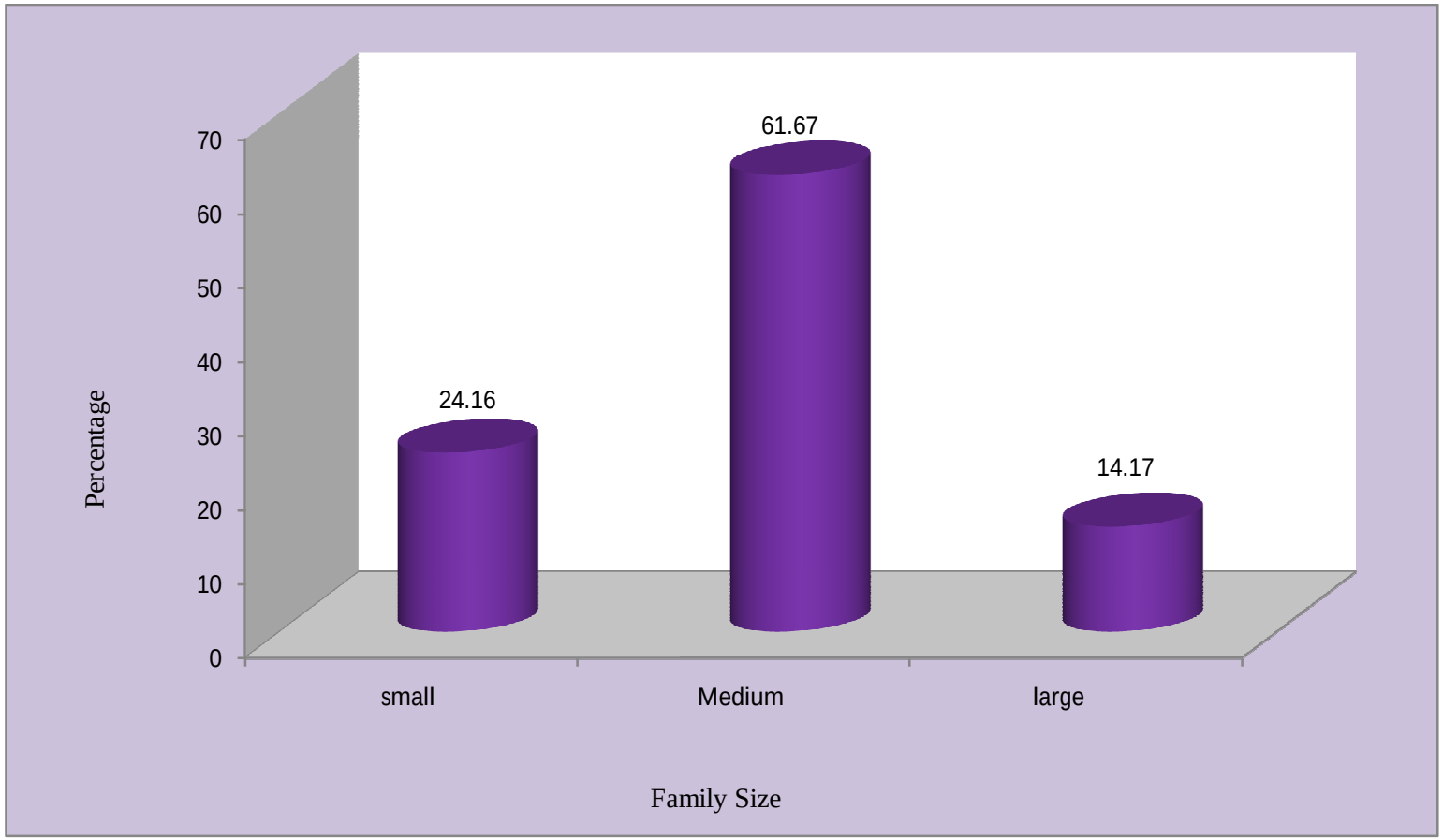

Fig. 4.5 Distribution of respondents according to their Family Size

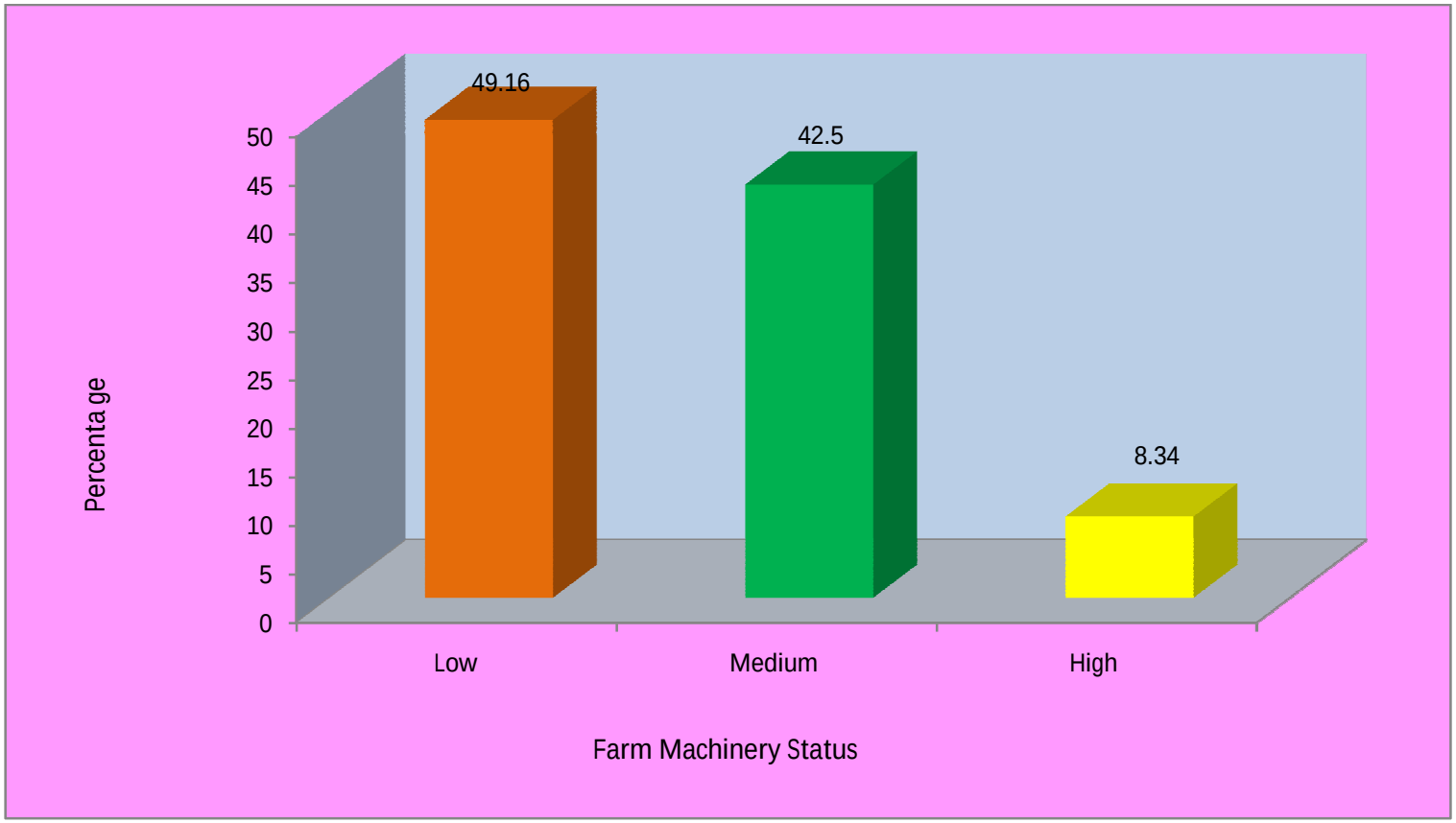

Fig. 4.6 Distribution of respondents according to their Farm Machinery Status

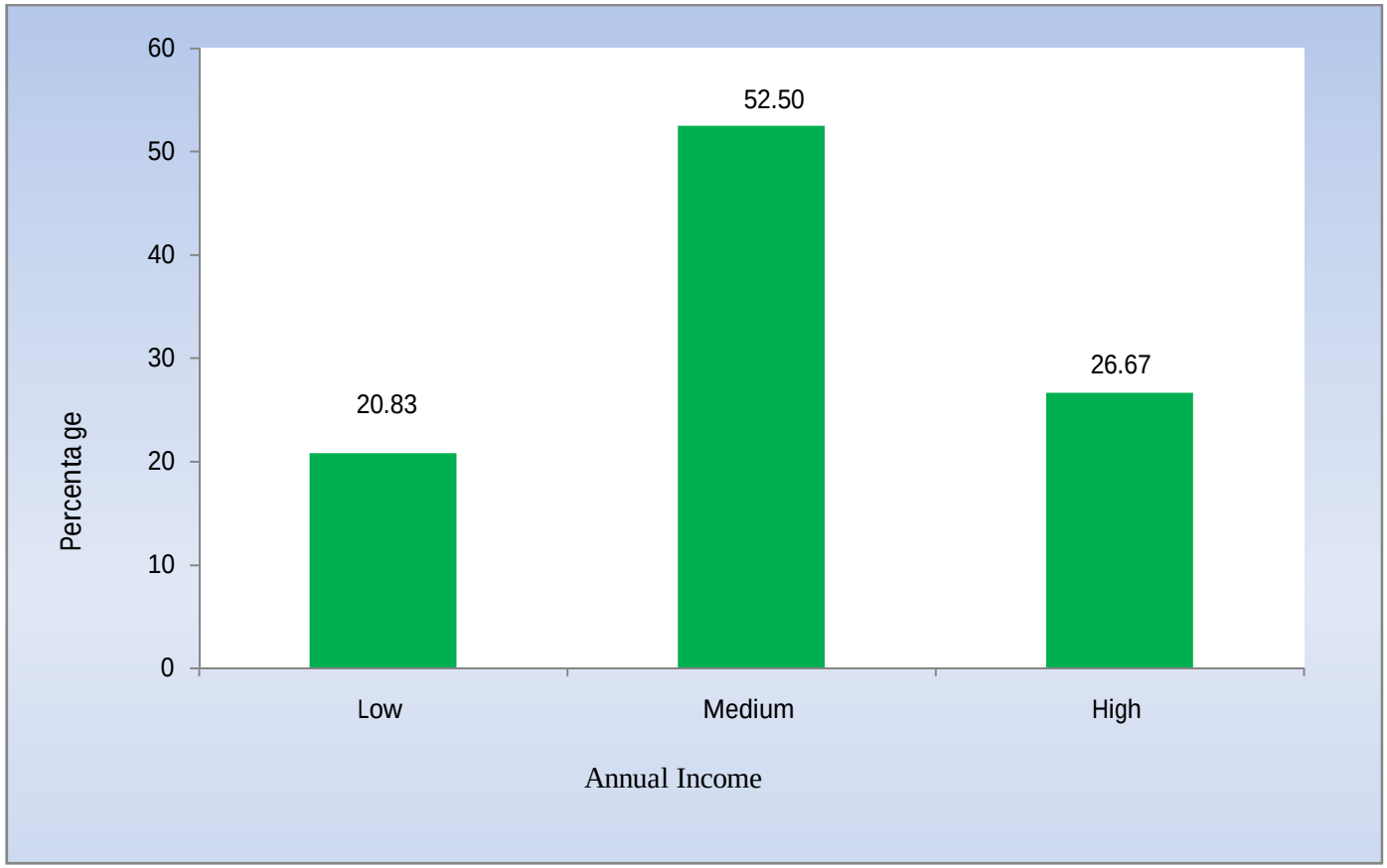

Fig. 4.7 Distribution of respondents according to their Annual Income

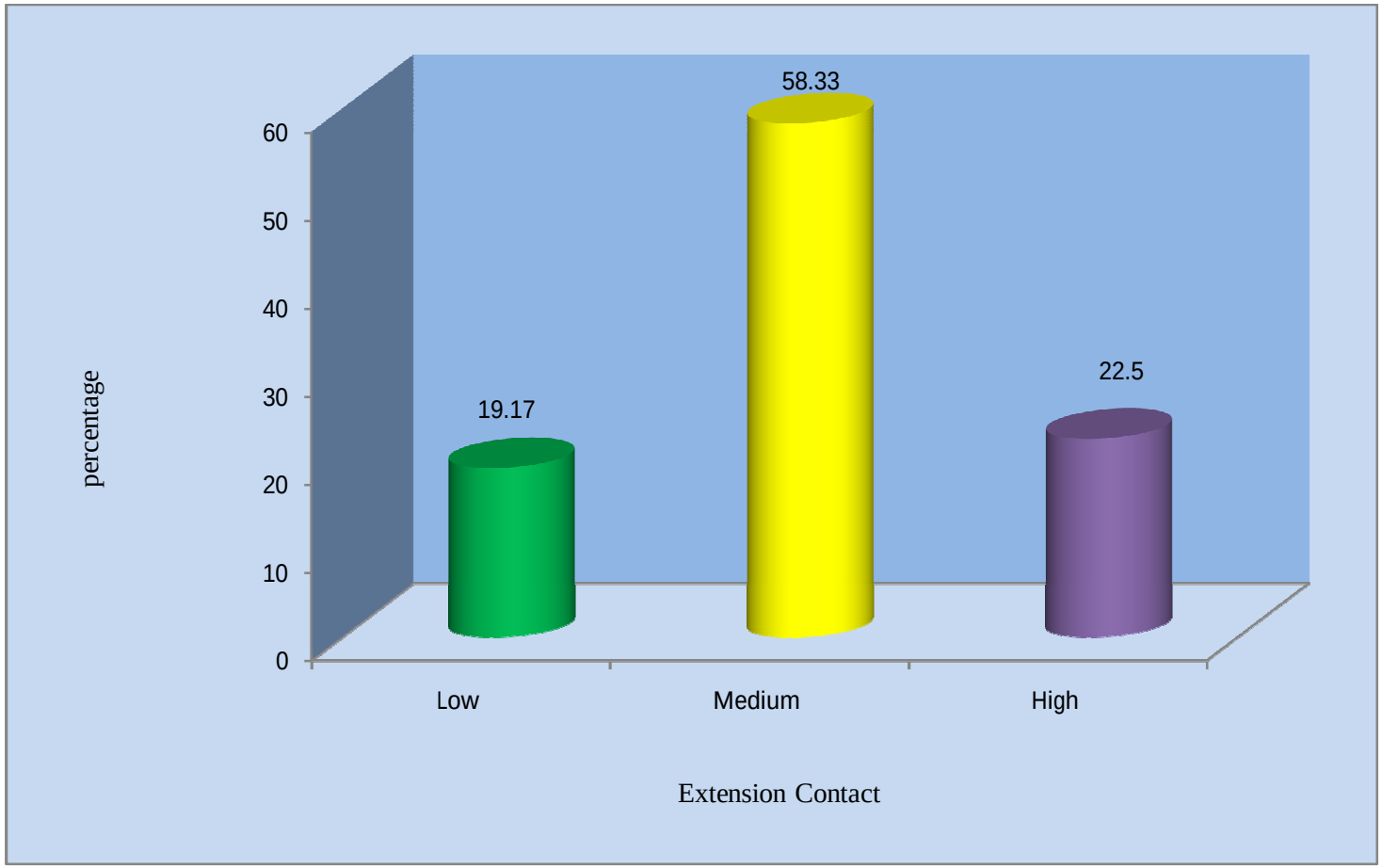

Fig. 4.8 Distribution of respondents according to their Extension Contact

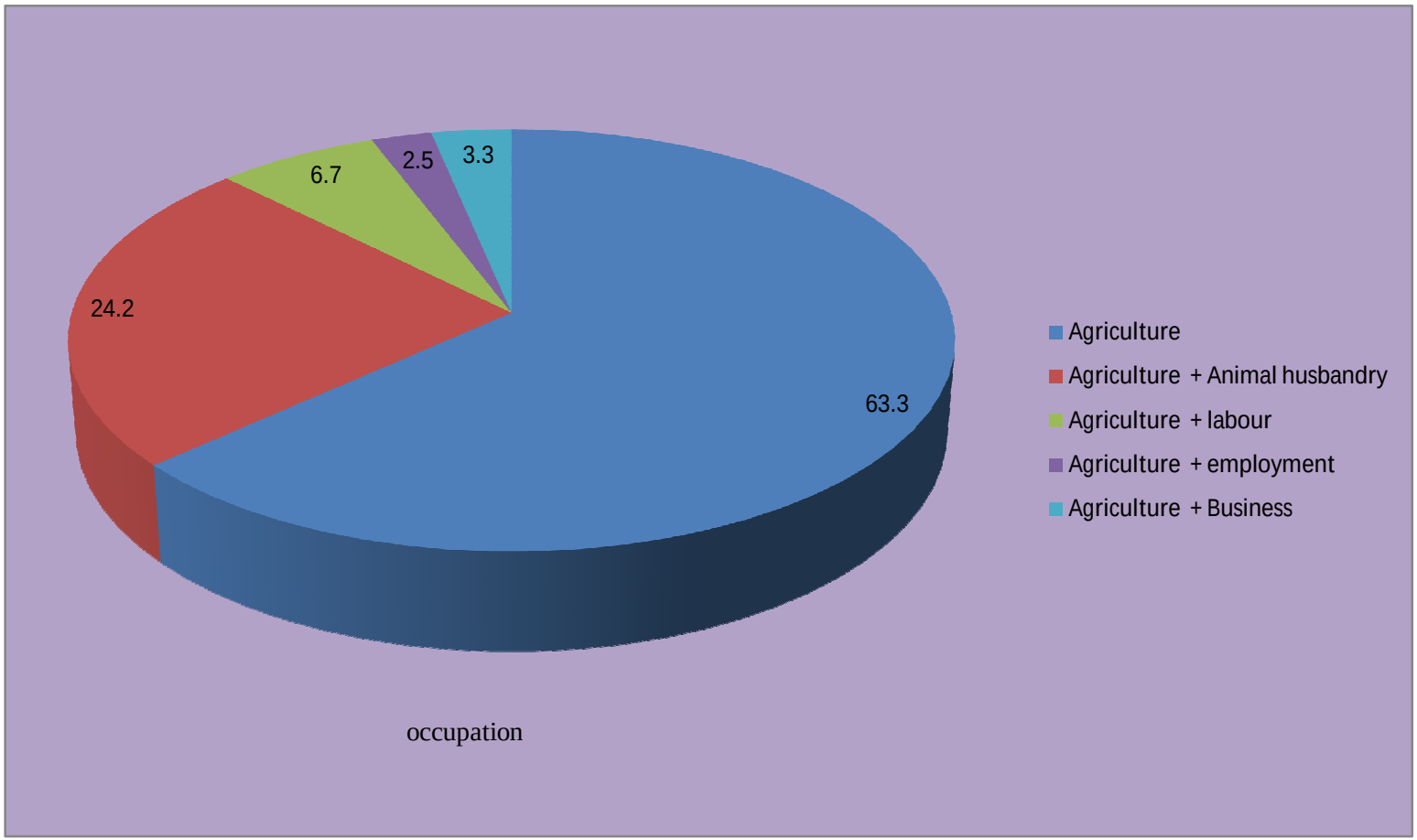

Fig. 4.9 Distribution of respondents according to their Occupation

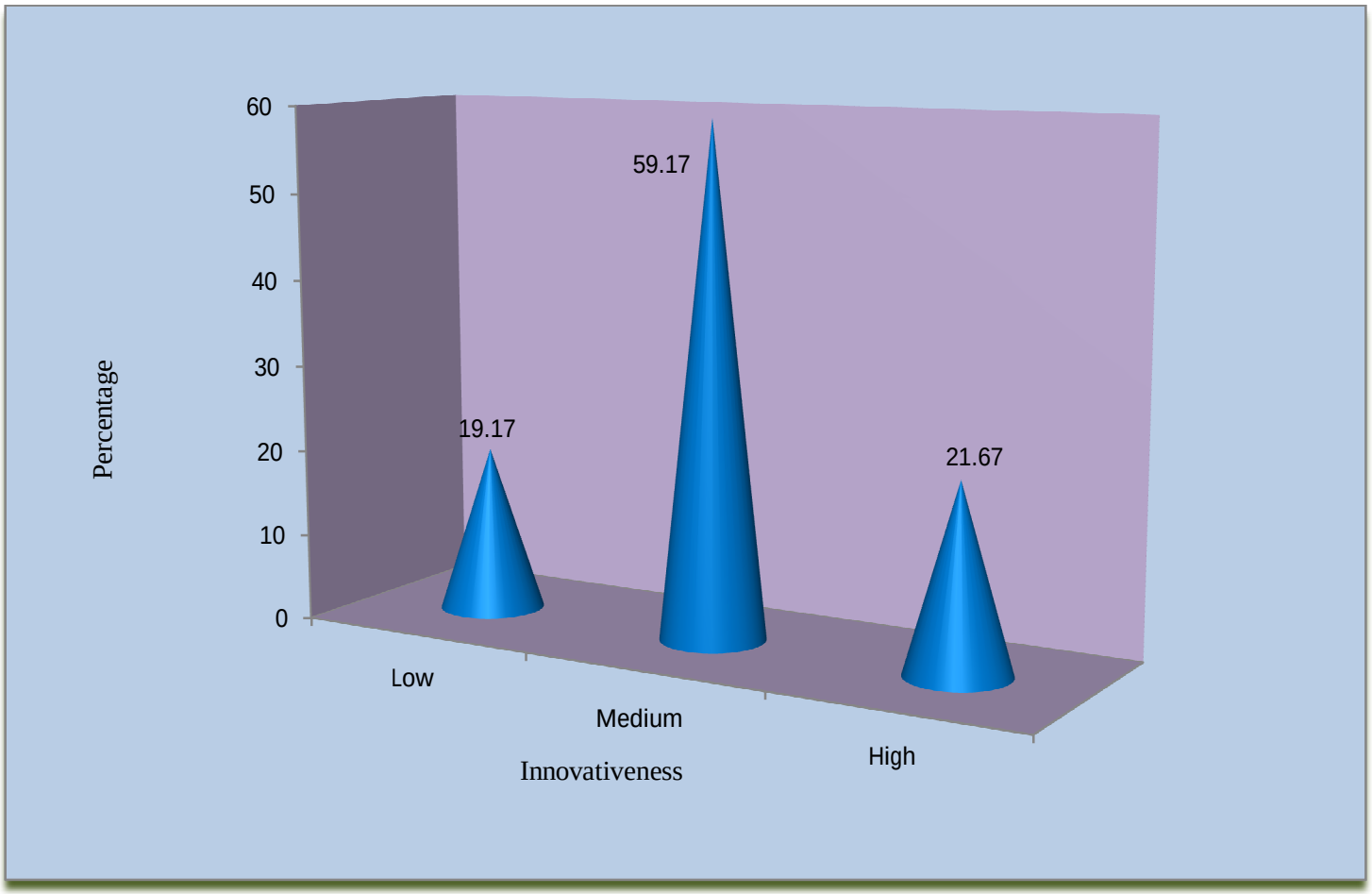

Fig. 4.10 Distribution of respondents according to their Innovativeness

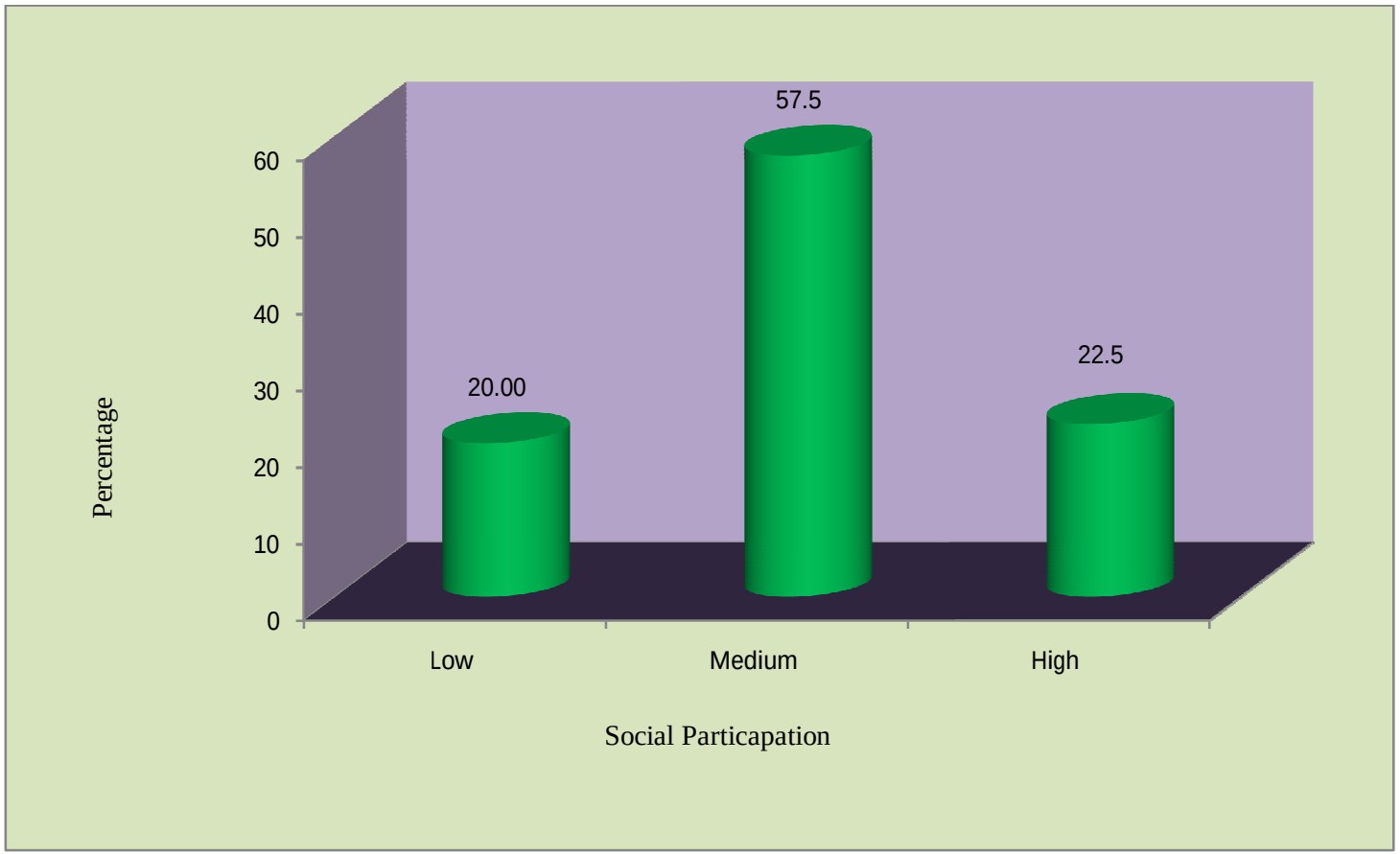

Fig. 4.11 Distribution of respondents according to their Social Participation

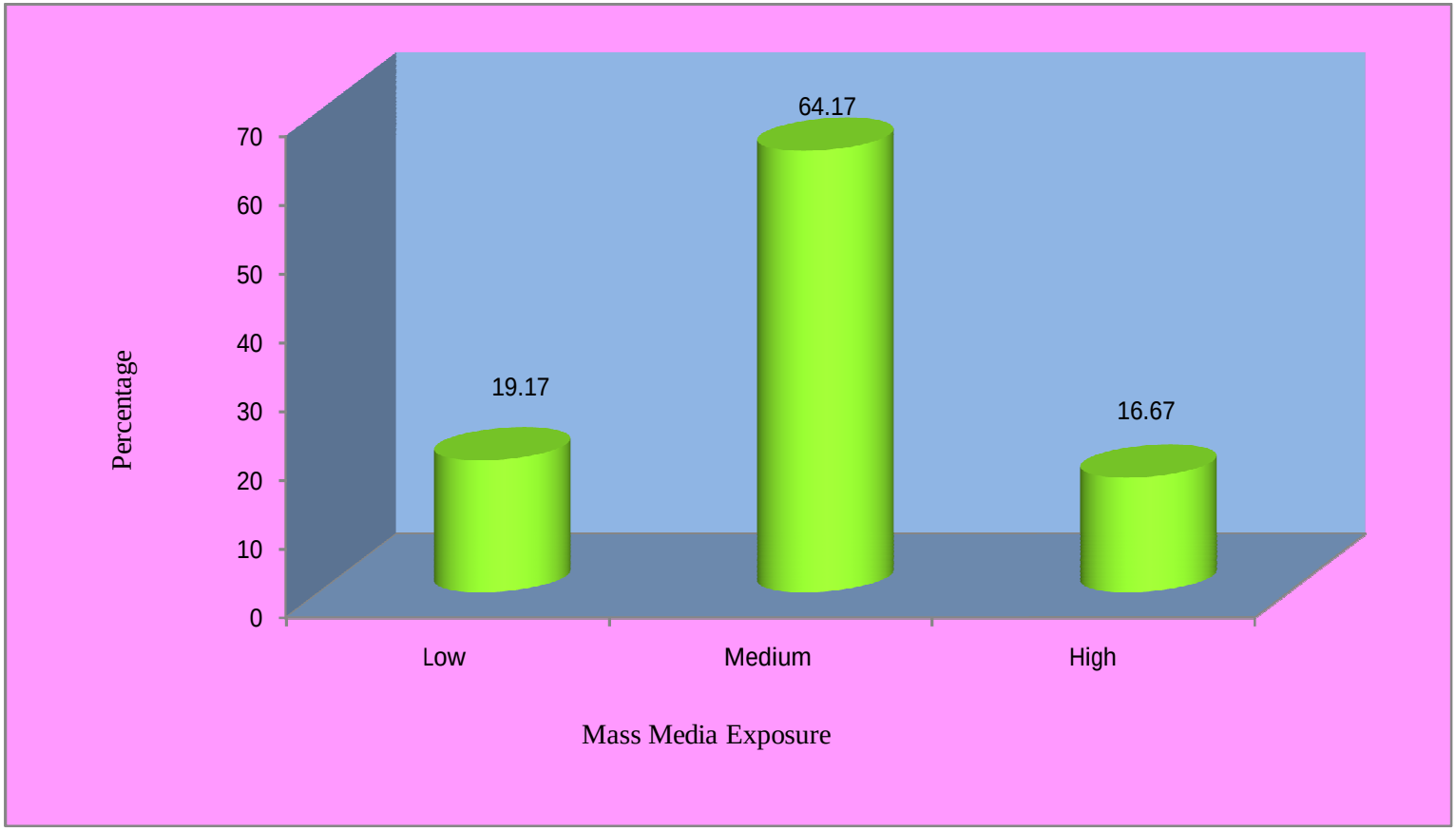

Fig. 4.12 Distribution of respondents according to their Mass Media Exposure

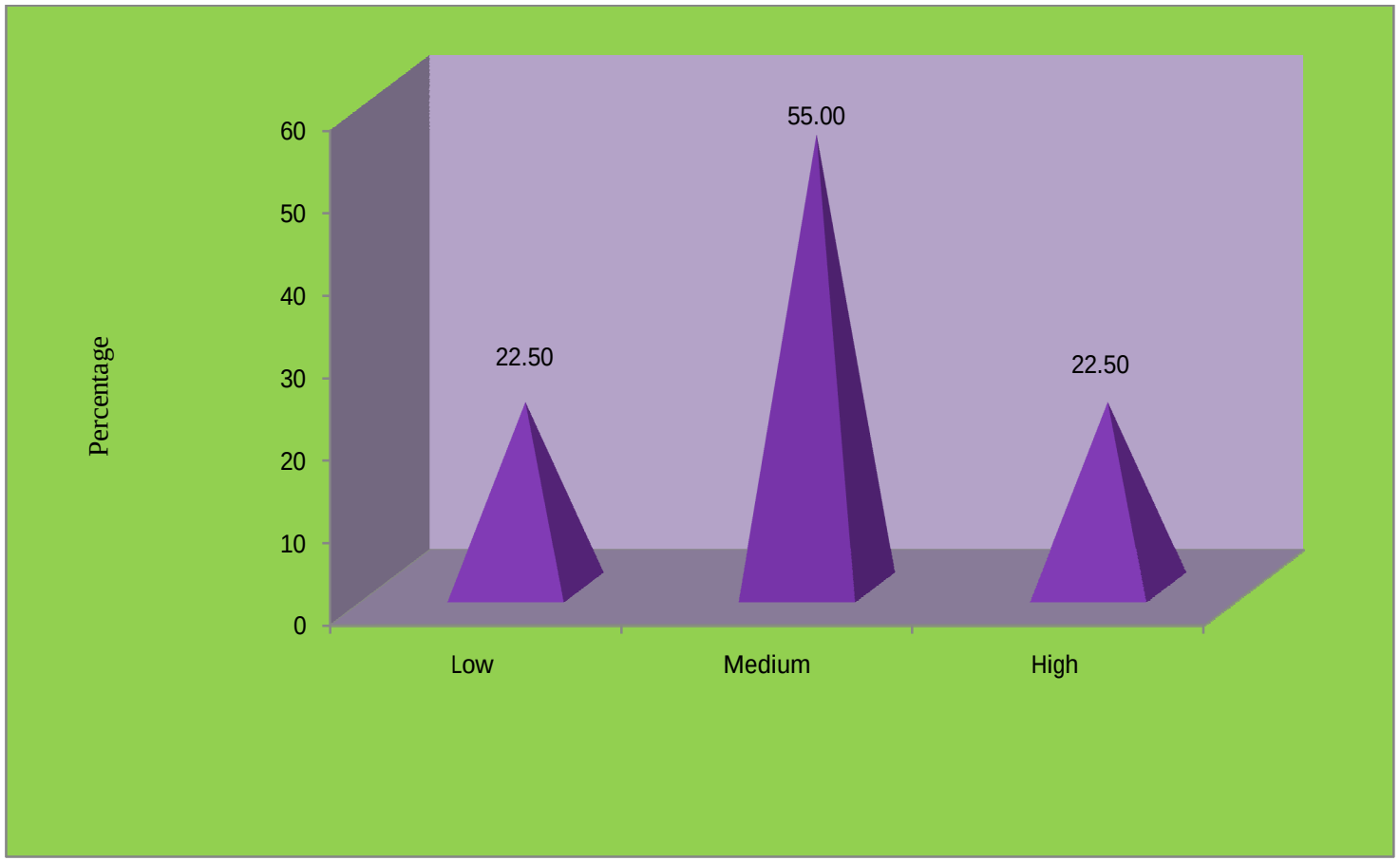

Fig. 4.13 Distribution of respondents according to their Market Orientation

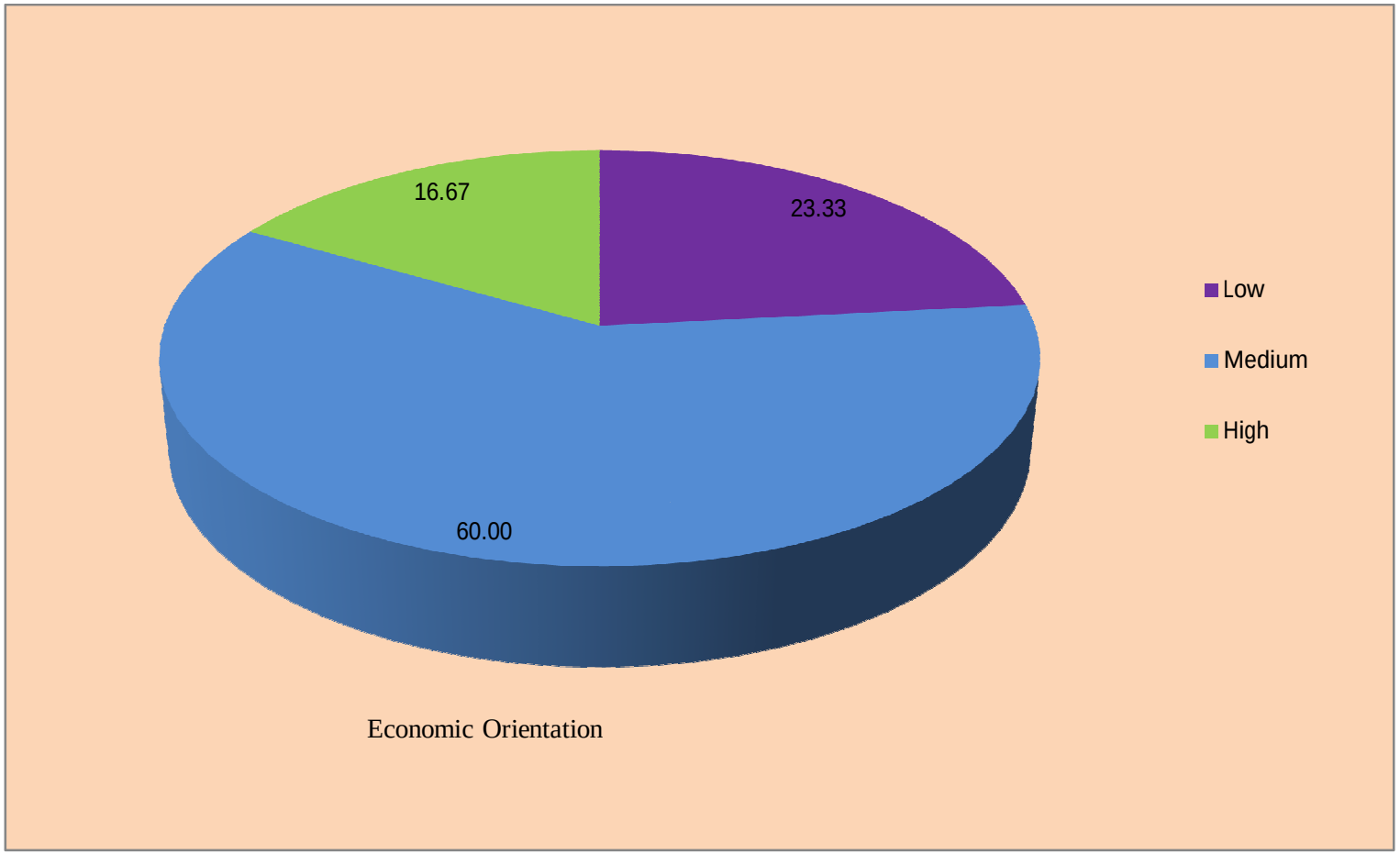

Fig. 4.14 Distribution of respondents according to their Economic Orientation

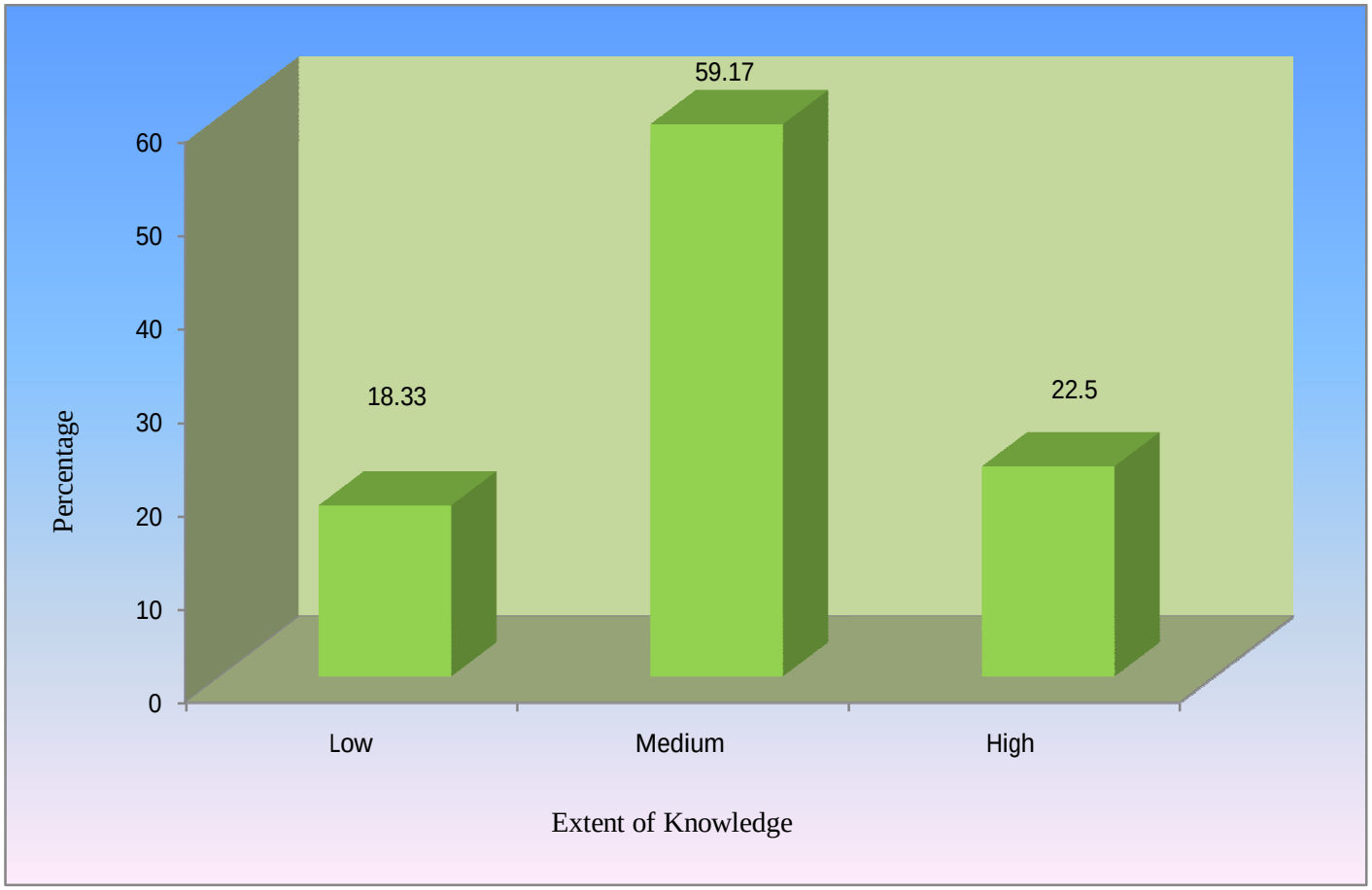

Fig. 4.15 Distribution of respondents according to their Extent of Knowledge

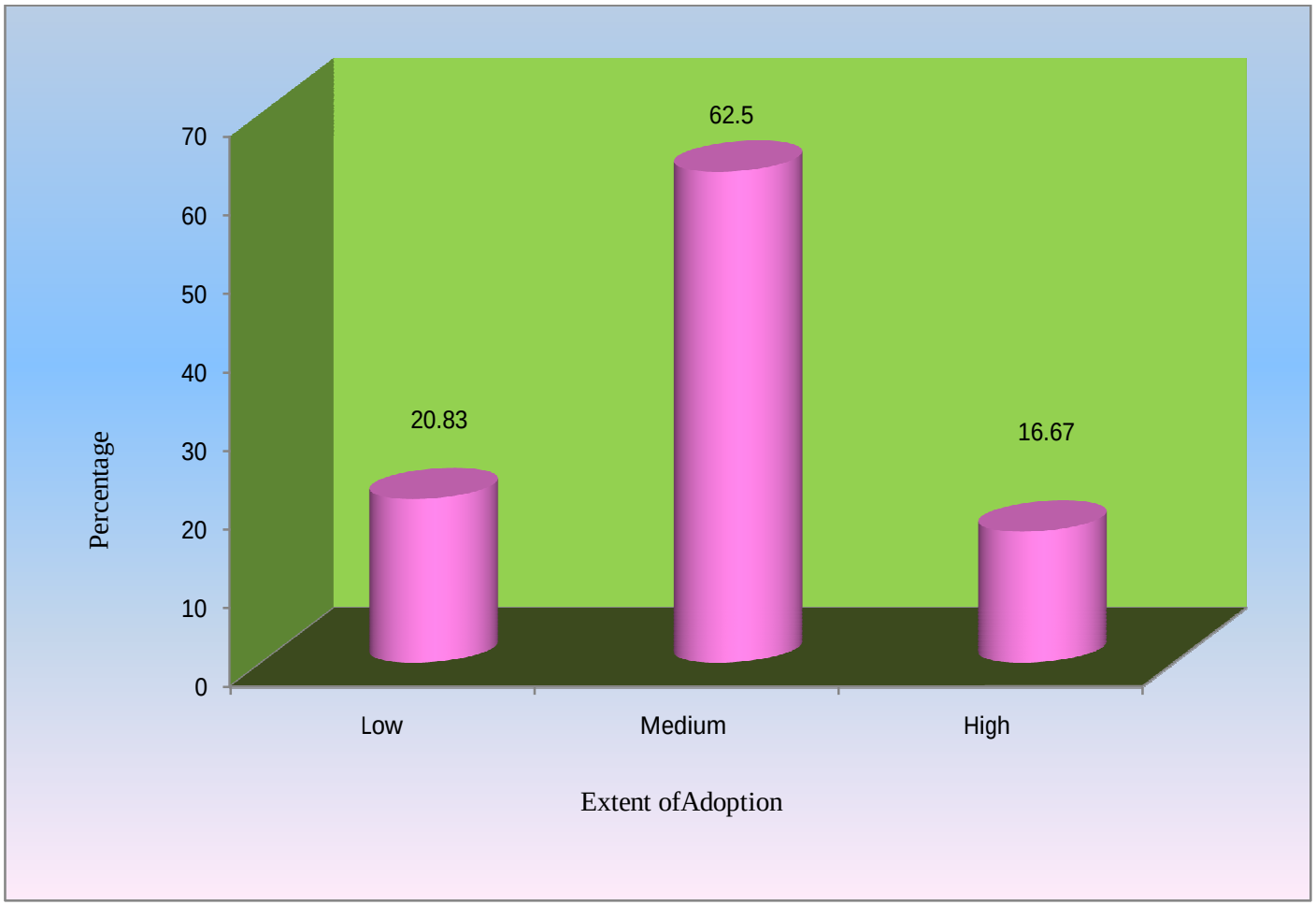

Fig. 4.16 Distribution of respondents according to their Extent of Adoption

LIST OF ILLUSTRATIONS

LIST OF SYMBOLS AND ABBREVIATIONS

*	:	Significant
%	:	Percentage
A	:	Intercept
ADA	:	Assistant Director of Agriculture
ADH	:	Assistant Director of Horticulture
AEO	:	Agricultural Extension Officer
ANGRAU	:	Acharya N. G. Ranga Agricultural University
AO	:	Agricultural Officer
ATMA	:	Agricultural Technology Management Agency
B	:	Regression co-efficient
CI	:	Class Interval
DAATTC	:	District Agricultural Advisory and Transfer of Technology Center
DAS	:	Days After Sowing
et al.	:	and other people
F	:	Frequency
Fig.	:	Figure
FFS	:	Farmers Field Schools
FTC	:	Farmers Training Centre
FYM	:	Farm Yard Manure
HO	:	Horticultural Officer
H_0	:	Null Hypothesis
H_1	:	Alternate Hyphothesis
Ha	:	Hectare
HRS	:	Horticultural Research Station
HYV	:	High Yielding Varieties
IASRI	:	Indian Agricultural Statistics Research Institute
i.e.,	:	That is
IFAD	:	International Fund for Agricultural Development
IPM	:	Integrated Pest Management
KVK	:	Krishi Vigyana Kendra

MAO	:	Mandal Agricultural Officer
MGNREGS	:	Mahatma Gandhi National Rural Employment Guarantee Scheme
MLR	:	Multiple Linear Regression
MOP	:	Murate of Potash
MT	:	Metric Ton
N	:	Total number of respondents
NSKE	:	Neem Seed Kernel Extract
NS	:	Non-significant
OFEDs	:	On-Farm Extension Demonstrations
PACS	:	Primary Agricultural Credit Societies
r	:	Correlation co-efficient
r^2	:	Coefficient of multiple determination
RSS	:	Regression Sum of Squares
S.D.	:	Standard Deviation
S. No.	:	Serial Number
SPSS	:	Statistical Packages for Social Sciences
SRI	:	System of Rice Intensification
SSP	:	Single Super Phosphate
TSS	:	Total Sum of Squares
viz.,	:	Namely
$ZNSO_4$	:	Zinc Sulpahte
ZREAC	:	Zonal Research and Extension Advisory Council

LIST OF TABLES

Fig. 3.1 Map showing Guntur district of Andhra Pradesh

Fig. 3.2 Map showing selected mandals of Guntur district

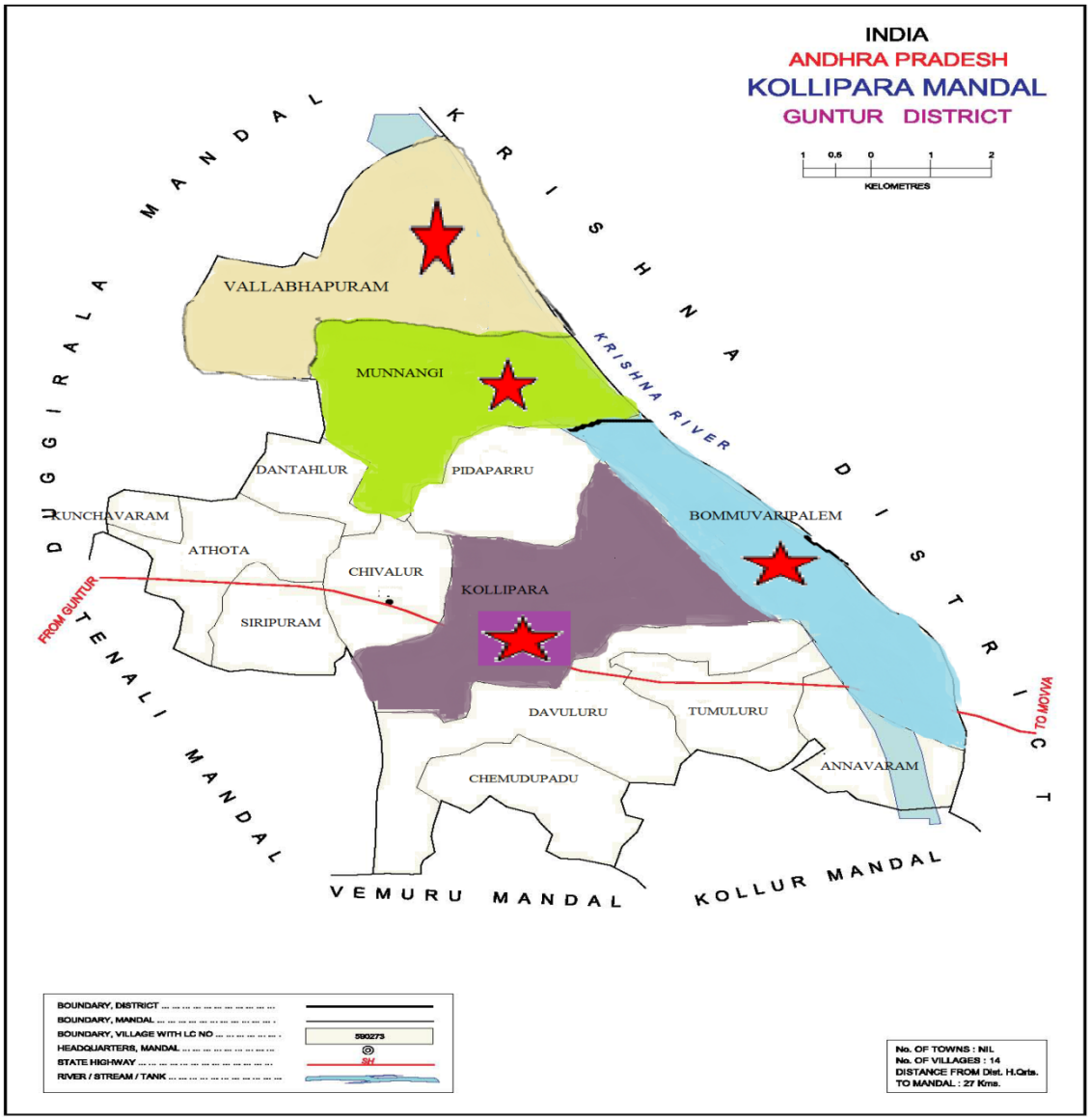

Fig. 3.3 Map showing selected villages of Kollipara mandal

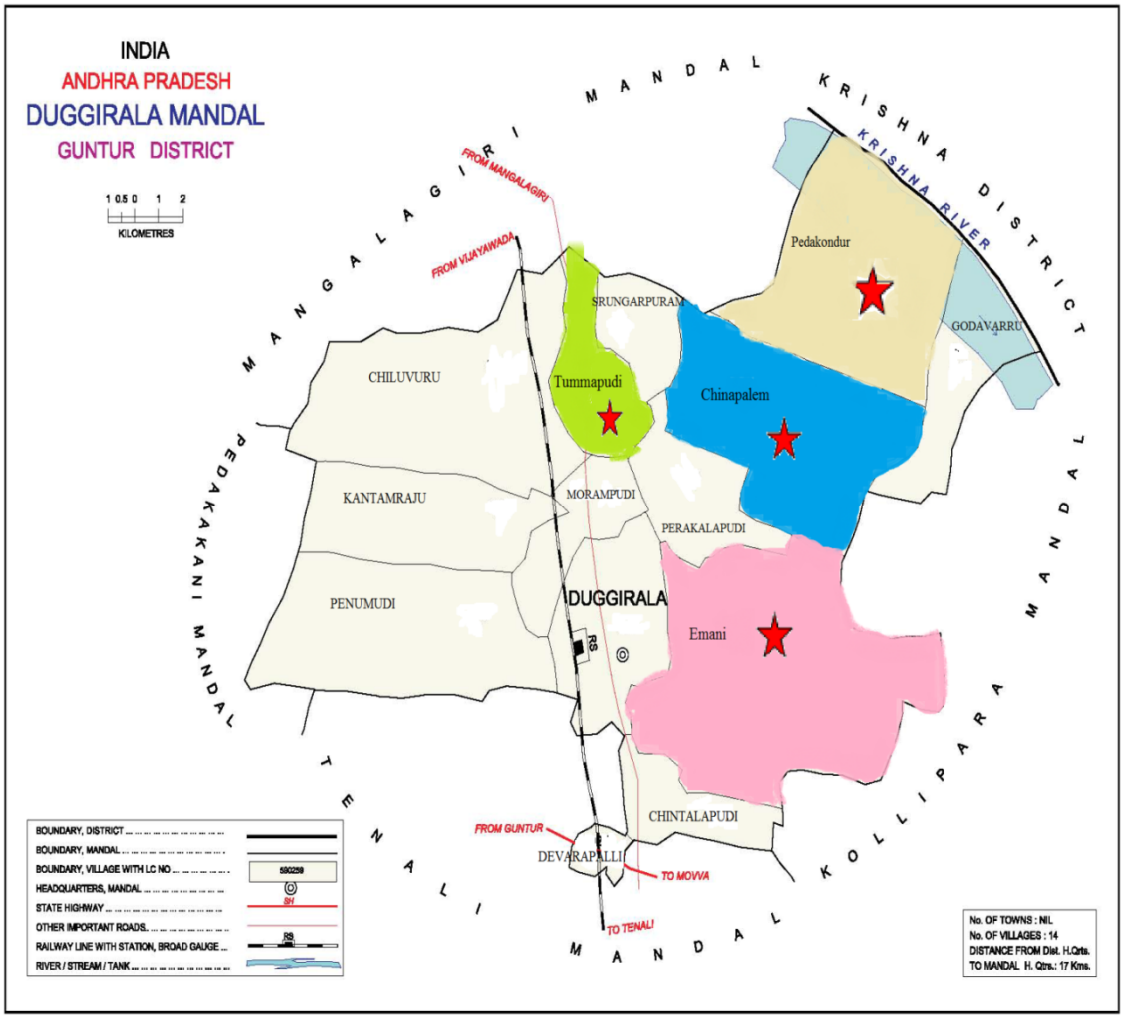

Fig. 3.4 Map showing selected villages of Duggirala mandal

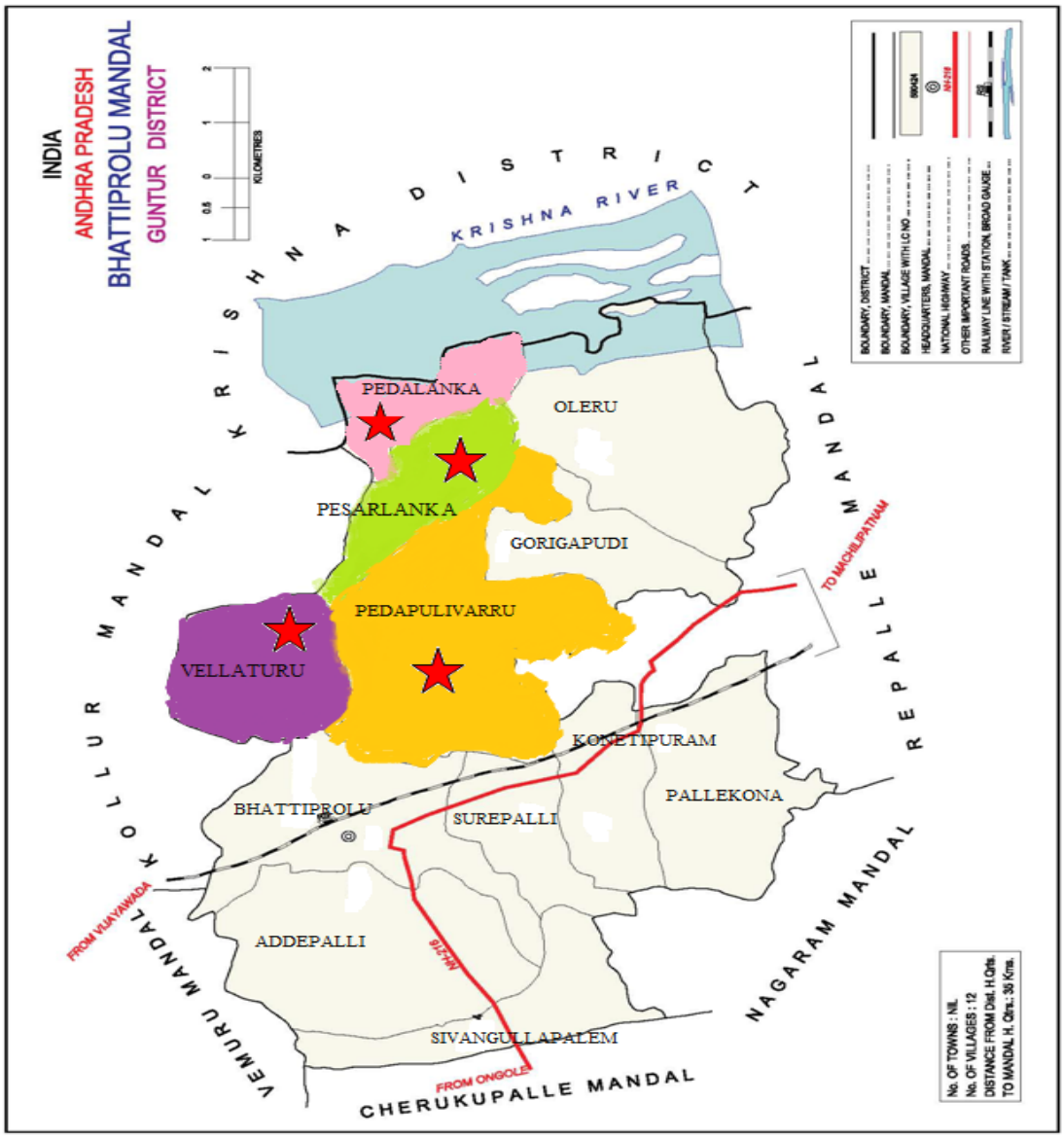

Fig. 3.5 Map showing selected villages of Bhattiprolu mandal

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
DEPARTMENT OF AGRCULTURAL EXTENSION
AGRICULTURAL COLLEGE, BAPATLA

"A STUDY ON KNOWLEDGE AND ADOPTION OF TURMERIC FARMERS IN GUNTUR DISTRICT OF ANDHRA PRADESH".

INTERVIEW SCHEDULE

PART-I
GENERAL INFORMATION

Respondent No: ☐

1. Name of the farmer :
2. Village :
3. Mandal :
4. Cell Phone No :

PROFILE CHARACTERISTICS OF THE TURMERIC FARMERS:

1. Age: ____ in completed years

2. Education			**Score**
i.	Illiterate	( )	1
ii.	Primary School	( )	2
iii.	Middle School	( )	3
iv.	High School	( )	4
v.	Intermediate Education	( )	5
vi.	Graduation	( )	6
vii.	Post Graduation	( )	7

3. Land Holding (in acres):

	Owned	**Taken on lease**	**Total area (in acres)**
Wetland	_____	_____	_____
Dry land	_____	_____	_____

4. Experience in Turmeric Cultivation:

a. Experience in farming----------years

b. Experience in turmeric cultivation ----------years

5. **Family Size:**

a. small (1-3 members)
b. medium (4-6 members)
c. large (7-9 members)
d. very large (more than 9 members)

6. Farm machinery status:

s.no	**Name of implement**	**number**
1	Spade	
2	Pic axe	
3	Iron plough	
4	Sprayer	
5	Rhizome boiler	
6	Steam boiler	
7	Rhizome Polisher	

7. Annual Income:

(a) Income from Agriculture _____
(b) Income from other sources

i. Dairy _____
ii. Poultry _____
iii. Agricultural Labour _____
iv. Non-Agricultural Labour _____
v. Service _____
vi. Business _____
vii. Any other _____

8. Extension Contact:

a) Do you have contact with extension worker: YES/NO

b) If yes, whom do you meet?

S.NO	Source	Frequency of contact			Purpose of contact	
		Frequently (3)	Occasionally (2)	Rarely (1)	Agriculture (2)	Non Agriculture (1)
	Formal					
1.	MPEO/ AEO					
2.	Mandal Agricultural officer					
3.	Assistant Director of Agriculture					
4.	Scientists from Research Stations					
5.	DAATTC's / KVK's scientists					
6.	NGO's					
	Informal					
1.	Friends & relatives					
2.	Progressive farmers					
3.	Input dealers					
4.	Agri-clinics					
5.	Any other (please specify) 1. 2. 3.					

9. Occupation:

S.NO	Categorisation	Score
1	Agriculture	1
2	Agriculture + Animal husbandry	2
3	Agriculture + unskilled labour	3
4	Agriculture + Skilled labour	4
5	Agriculture + Business	5
6	Agriculture + Professional	6

10. Innovativeness:

A set of statements given below represents innovativeness of the farmers. Please express your feeling about the statements by indicating the degree of your agreement on the Three point continuum.

S.NO.	Statements	Response Categories		
		A (3)	UD(2)	DA(1)
1.	Do you want to learn new practices in Turmeric farming?			
2.	If the Mandal Agricultural Officer gives a talk on techniques in Turmeric cultivation aspects would you like to attend?			
3.	Do you want to change in your way of life?			
4.*	A farmer should try to cultivate the way his parents did.			
5.	Do you want your son to become the innovative farmer?			
6.*	Do you think better enjoy today and let tomorrow take care of itself?			
7.	If a new practice is introduced in your village, will you be among the first few to adopt it?			

11. Social Participation:

a. Are you a member of any of the organizations? YES / NO.
b. If YES. Please indicate the following information.

S. No	Name of the Organization	Membership	
		Member (2)	Non-member (1)
1.	Gram panchayat /Gramasabha		
2.	Co-operatives		
3.	Youth clubs		
4.	Rytu Mitra Groups		
5.	Farmers Association Association		
6.	Janmabhoom committee		
7.	Self Help group		
8.	Any other (please specify) i ii.		

12. Mass Media Exposure:

You may be getting information on agricultural technology through various sources. Please tell me which of the following sources you have utilized for getting information on Turmeric production technology and how often?

S.NO.	Source	Extent of Exposure		
		Regularly (3)	**Occasionally (2)**	**Never (1)**
1.	Radio Programmes			
2.	Television Programmes			
3.	News paper			
4.	Books on Agriculture/Horticulture			
5.	Farm Magazines like Padipantalu and Annadata			
6.	Exhibitions and Kissan Melas			
7.	Mobile calls and sms			
8.	Internet browsing			
7.	Any other (specify)			

13. Market orientation:

s.no	statements	Agree (3)	Undecided (2)	Disagree (1)
1	Market information is use full to farmers			
2	A farmer can get good price by grading his produce			
3	Storage of the produce can help to get better price for his/her produce.			
4*	One should sell his produce to the nearest market irrespective of prices			
5*	One should purchase his inputs from shop where his other relatives purchase			
6	One should grow those varieties which have more market demand			

14. Economic orientation:

A set of statements given below represents Economic motivation of the farmers. Please express your feeling about the statements by indicating the degree of your agreement on the five point continuum**.**

S.NO	Statements	Response Categories				
		SA(5)	A(4)	UD(3)	DA(2)	SDA(1)
1.	A Turmeric farmer should work towards higher yield and economic gains.					
2.	The most successful Turmeric farmer is one who makes more profits.					
3.	A farmer should grow high yielding varieties to increase monitory profits than local varieties.					
4.	A farmer should try the new farming ideas, which may earn him more money.					
5.	It is difficult for the farmer's children to make good start unless he provides them with economic assistance.					
6*.	A farmer must cash his living but the most important thing in life cannot be defined in economic terms.					

PART-II

LEVEL OF KNOWLEDGE OF FARMERS ON THE SELECTED PRODUCTION

1. The turmeric varietie Duggirala, salem and tekurpet are the ( )
   a) long duration varieties b) short duration varieties
   c) medium duration varieties d) semi medium duration varieties

2. Long duration varieties of turmeric mature by. ( )
   a) 7 months b) 8 months c) 9 months d) 10 months

3. For export of the turmeric the Curcumin content should be. ( )
   a) 4 % b) 5.5% c) 9% d) 13%

4. Best time for sowing of long duration varieties is in. ( )
   a) First fortnight of May c) First fortnight of June
   b) second fortnight of June d) second fortnight of august.

5. In last ploughing the amount of FYM should be added is ( )
   a) 10 tonnes b) 5 tonnes c) 25 tonnes d) 20 tonnes

6. Seed rhizomes are soaked in Ridomil @ 3 gms/lit, before sowing for time period of.
   a) 10 minutes b) 20 minutes c) 60 minutes d) 40 minutes ( )

7. The optimum seed rate recommended for seed rhizomes for one acre is. ( )
   a) 500 kgs. b) 1000 kgs. c) 1500 kgs. d) 2000 kgs.

8. The optimum spacing turmeric of in ridges and furrows method is. ( )
   a) 45 × 20 cm b) 55 × 30 cm c)20 × 20 cm d) 30 × 30 cm

9. Rhizome fly infestation will cause. ( )
   a) Dead hearts b) wilting c) drying d) all the above

10. The germination process in Turmeric completes by. ( )
    a) 20 DAS b) 30 DAS c) 35 DAS d) 45 DAS

11. The dosage of pendimethalin which has to be be sprayed for control of weeds/ acre is.
    a) @ 1 lit /acre b) @ 2 lit /acre c) @ 3 lit /acre d) @ 0.5 lit /acre ( )

B. Please fill in the blanks with appropriate words.

12. The recommended dosage of Urea fertilizer is dosage for turmeric _____ .

13. The recommended dosage of SSP fertilizer in turmeric is _____ .
14. The recommended dosage of MOP fertilizer in turmeric is _____
15. Collar region of the pseudostem becomes soft resulting in collapse of the plant and decay of rhizomes is the symptom of _____.
16. Within how many days the harvested rhizomes should be boiled. _____
17. What is the characteristic symptom of completely boiled rhizomes. _____
18. Which disease attacks when boiled rhizomes are not properly boiled _____
19. During last stage of polishing which solution mixture is sprayed over rhizomes_____

C. Please indicate your answer by underlining True/False for the following statements.

20.* The optimum time period required for complete boiling of rhizomes is 20 mins. **True/False**
21. Nitrogen fertilizerts should applied at the time of sowing, 40, 80 and 120 DAS **True/False**
22. Turmeric leaf blotch can be controlled by spraying carbendizim @ 1ml /lit water. **True/False**
23. Decrease in yield is noticed when sowing is done after second fortnight of July. **True/False**
24. If drip system is used for irrigation the laterals spaced at 1 meter distance and emitters at 60 cm distance. **True/False**
25.* Iron deficiency can be corrected by spraying ferrous sulphate @ 15 gm/ lit. **True/False**
26.* When rhizome rot is observed in field, gap between two irrigations should be decrease. **True/False**
27. Brown spots of various sizes on the upper surface of the young leaves is a symptom of leaf spot. **True/False**

D. Please indicate your answer by underlining Yes/No for the following statements.

28. Zinc sulphate should be added to soil during land preparation. **Yes/No**
29. Turmeric crop can be grown in heavy soils with 15- 20 irrigations. **Yes/No**
30*. Main season of harvesting falls in May – July. **Yes/No**
31. Placing of neem cake at collar region of plants can control the Leaf Spot and Blotch. **Yes/No**
32*. Rhizome rot incidence is more in when irrigated with drip system. **Yes/No**
33*. Rhizome fly can be controlled by application of carbofuran granules. **Yes/No**
34. Crop rotation was compulsory practice in turmeric cultivation. **Yes/No**

PART-III

ADOPTION OF PACKAGE OF PRACTICES BY THE FARMERS IN TURMERIC CULTIVATION

S. No	Recommended practice	FA(3)	PA(2)	NA(1)
1.	**Soils:** Heavy soils.			
2.	***6***-8 times deep summer plough			
	Sowing practices			
3.	Seed rate : 1000 kg/acre			
4.	Transplanting of seedlings			
5.	Seed treatment : Ridomil @ 3g/lit water			
	Malathion @ 5 ml /lit water			
	Trichoderma viride 5 g/lit water			
6.	Sowing completed by July second fortnight			
7.	Method of sowing: Ridge and furrow			
8.	Depth of sowing: 8-12 cm			
9.	Sowing varieties like Duggiral, Tekurpeta, Suguna			
	Nutrient Management			
10.	In last plough: FYM @ 10 tonnes / acre			
	Castor/Neem cake @ 200 kg/acre			
	$ZnSo_4$ @ 10 kg/ acre			
	SSP @150 kg. acre			
	MOP @ 25 kg/acre			
11.	At sowing time : Neem cake @200kg /acre			
	Weed management			
12.	Weed free conditions should be maintained up to 120 DAS.			
13.	Pendimethalin @ 1 lit in 200 litres of water			
	Water management			
14.	In heavy soils 15-20 irrigation are given			
15.	Drip system is followed in irrigation			
	Pest management			
16.	Rhizome scales: Seed treatment with malathoin @ 5ml/lit for 30 mins			
17.	Rhizome fly: a) Seed treatment with profenophos @2ml/lit			
	Disease management			
18.	Rhizome rot: a) Soil drenching with Ridomil MZ @2.5 g/lit.			
	b) Seed treatment with Ridomil MZ@ 3 g/lit for 30 min			
	c) Seed treatment with Trichoderma @ 5g/l			
19.	Turmeric leaf blotch: Carbendazim @ 1 g/l			

20.	Turmeric leaf spot : Spray Carbendazim@1 g/l + Propiconazole @1 ml/l two times in 15 days gap			
	Harvesting			
21.	Harvesting stage: all leaves turns dry and falls on soil			
22.	Using mechanical harvesters			
	Post harvest technology:			
23.	Harvested rhizomes should boil within 2-7 days			
24.	Boiling fingers and mother rhizomes separately			
25.	Boiling is stopped when forth comes out and white fumes appear			
26.	Rhizomes should be boiled for time period of 45-60 minutes			
27.	Use of steam boilers for boiling of turmeric produce.			
28.	Boiled rhizomes are dried for 10-15 days			
29.	Artificial dryers are used for drying boiled rhizomes.			
30.	Dried rhizomes are polished to improve appearance.			
31.	Grading of rhizomes according to size			
	Storage			
32.	Gunny bags used for storing rhizomes in godown are sprayed with Malathion @ 10 ml/l.			
33.	Not storing seed rhizomes under direct sun light			
44.	Using e-trading/ online trading			

PART- IV

CONSTRAINTS IN ADOPTION OF SELECTED PRODUCTION TECHNOLOGY OF TURMERIC

From the constraints listed below in the Turmeric cultivation, please mention the constraints which you are facing.

CONSTRAINTS **RESPONSE**

A. Sowing

1.

2.

3.

4.

B. Fertilizers:

1.

2.

3.

4.

C. Irrigation:

1.

2.

3.

4.

D. Weed management:

1.

2.

3.

4.

E. Plant protection:

1.

2.

3.

4.

F. Financial:

1.

2.

3.

4.

G. Labour:

1.

2.

3.

4.

H. Harvesting:

1.

2.

3.

4.

I. Post Harvest:

1.

2.

3.

4.

J. Marketing:

1.

2.

3.

4.

PART- V

Please give your suggestions to overcome the above said constraints in turmeric cultivation.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Signature of the farmer

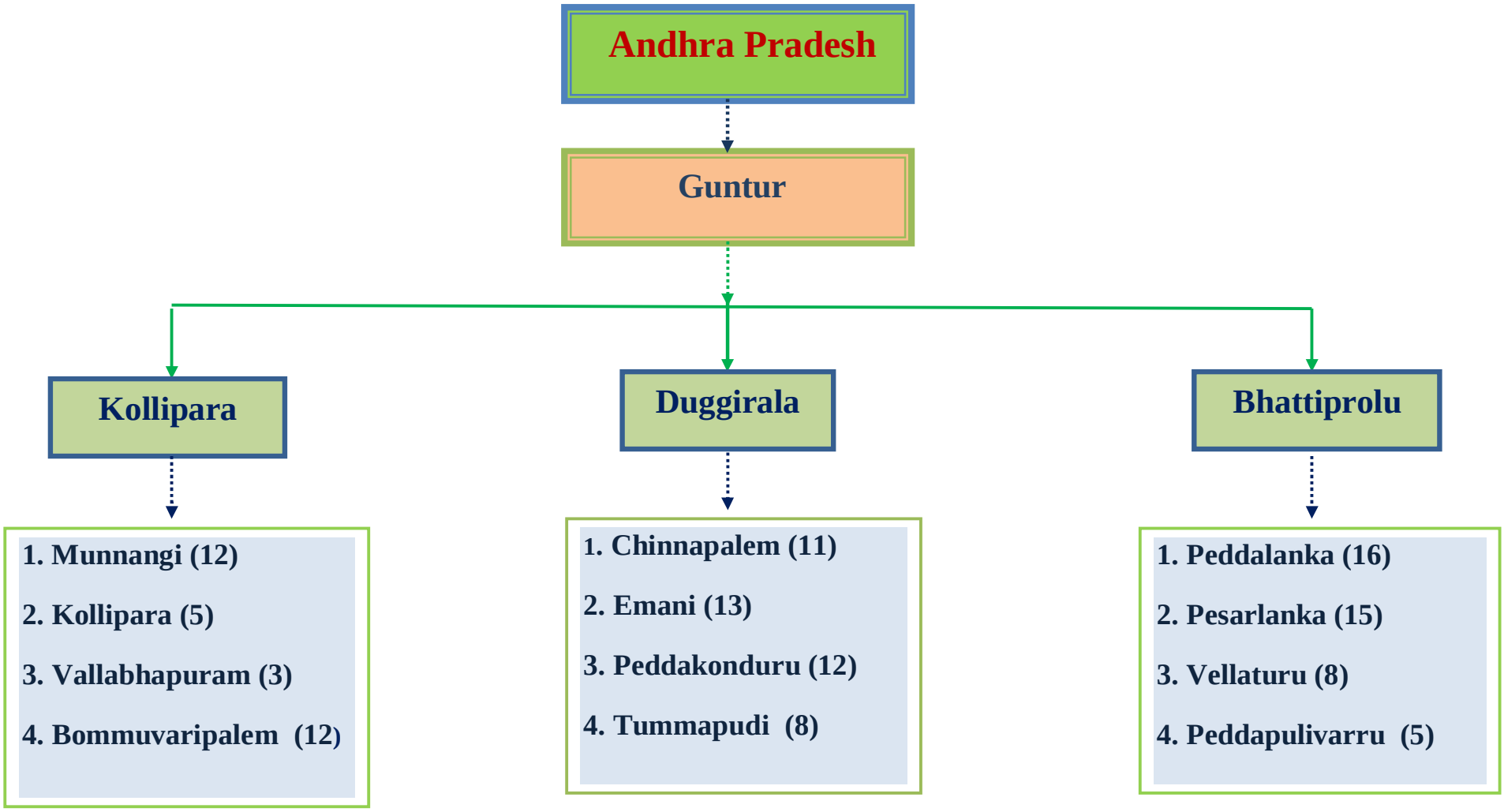

Fig 3.6 Schematic representation of sampling procedure

ఆచార్య ఎన్.జి. రంగా వ్యవసాయ విశ్వవిద్యాలయము

వ్యవసాయ విస్తరణ విద్యా విభాగము

వ్యవసాయ కళాశాల, బాపట్ల - 522 101

మౌఖిక ప్రశ్నపత్రం

పరిశోధన అంశం : గుంటూరు జిల్లాలో పసుపు రైతుల పరిజ్ఞానం మరియు ఆచరణపై అధ్యయనం

భాగము -1

జవాబుదారుని సంఖ్య :

సాధారణ సమాచారము :

జవాబుదారుని పేరు :

సంప్రదించు ఫోన్ నెంబరు :

గ్రామము :

మండలము :

జిల్లా :

పరిగణనలోకి తీసుకోబడిన రైతు లక్షణాలు :

1) వయస్సు (పూర్తి అయినసంవత్సరములలో) :

2) విద్య :

1. నిరక్షరాస్యత - - - (1)
2. చదవడం, వ్రాయడం వచ్చును - - - (2)
3. ప్రాథమిక విద్య - - - (3)
4. మాధ్యమిక విద్య - - - (4)
5. ఉన్నత పాఠశాల విద్య - - - (5)
6. కళాశాల విద్య - - - (6)
7. విశ్వవిద్యాలయ విద్య - - - (7)

3) క్షేత్ర పరిమాణం :

		సొంతం	కౌలు	మొత్తం
అ.	నీటి పారుదల	-------	-------	-------
ఆ.	వర్షాధారం	-------	-------	-------

4) క్షేత్ర అనుభవం :

అ. వ్యవసాయంలో అనుభవం ------ సం॥

ఆ. పసుపు సాగులో అనుభవం ------ సం॥

5) కుటుంబ పరిమాణం :

అ. చిన్న కుటుంబం (1 నుండి 3 సభ్యులు) (1)

ఆ. మధ్యస్థ కుటుంబం (4 నుండి 5 సభ్యులు) (2)

ఇ. పెద్ద కుటుంబం (7 నుండి 9 సభ్యులు) (3)

ఈ. అతి పెద్ద కుటుంబం (9 కంటే ఎక్కువ సభ్యులు) (4)

6) వ్యవసాయ పనిముట్లు :

క్ర.సం.	పనిముట్టు పేరు	సంఖ్య
1.	పార	
2.	నాగలి	
3.	స్ప్రేయర్ (పిచికారి యంత్రం)	
4.	ఉడకబెట్టు యంత్రం	
5.	ఆవిరి యంత్రం	
6.	పాలిషర్	
7.	ట్రాక్టర్	

7) వార్షికాదాయం :

ఎ. వ్యవసాయం నుండి ఆదాయం ----------

బి. ఇతరముల నుండి ఆదాయం ----------

అ. పాడి పరిశ్రమ ----------

ఆ. కోళ్ళ పరిశ్రమ ----------

ఇ. వ్యవసాయ కూలి ----------

ఈ. వ్యవసాయేతర కూలి ----------

ఉ. ఉద్యోగము ----------

ఊ. వ్యాపారము ----------

ఋ. ఇతరములు ----------

మొత్తం ----------

8) విస్తరణ సంబంధం :

అ. మీకు విస్తరణ అధికారులతో సంబంధాలు ఉన్నాయా? అవును/లేదు

ఆ. ఉన్నట్లయితే మీరు ఎవరిని కలుస్తారు?

క్రమసం.	వర్గము	స్పందన			సంబంధం యొక్క తీరు	
		తరచుగా (3)	సందర్భానుసారం (2)	అరుదుగా (1)	వ్యవసాయం (2)	వ్యవసాయేతర (1)
	అధికారిక :					
1,	బహుళ ప్రయోజన విస్తరణ అధికారి/ వ్యవసాయ విస్తరణ అధికారి					
2.	వ్యవసాయ అధికారి / ఉద్యానవన అధికారి					
3.	ఉద్యాన సహాయ సంచాలకులు					
4.	పరిశోధనా స్థానాల శాస్త్రవేత్తలు					
5.	ఏరువాక / కె.వి.కె. శాస్త్రవేత్తలు					
6.	ఎన్.జి.ఓ.					
	అనధికారిక :					
1.	స్నేహితులు, బంధువులు					
2.	ఆదర్శ రైతు					
3.	వ్యవసాయ ఉత్పాదకాల వర్తకుడు					
4.	అగ్రిక్లినిక్					
5.	ఇతరములు (పేర్కొనుము					
	1)					
	2)					
	3)					

9) వృత్తి :

1.	వ్యవసాయం	1
2.	వ్యవసాయం + పశు సంరక్షణ	2
3.	వ్యవసాయం + కార్మికుడు	3
4.	వ్యవసాయం + ఉద్యోగం	4
5.	వ్యవసాయం + వ్యాపారం	5
6.	వ్యవసాయం + ఇతరములు	6

10) నూతన ఆలోచన తీరు :

ఈ క్రింద పొందుపరచబడిన వాక్యాలు రైతుయొక్క నూతన ఆలోచన తీరును ప్రతిబింబిస్తాయి.

దయచేసి మూడంకెల క్రమానుసారిణిపై మీ స్పందనను వ్యక్తపరచండి.

క్రసం.	వివరము	స్పందన		
		ఒప్పుకుంటాను (1)	నిర్ణయించలేను (2)	ఒప్పుకోను (3)
1,	మీరు పసుపు సాగులో నూతన విధానాలను నేర్చుకోవానుకుంటున్నారా?			
2.	ఒకవేళ ఆధునిక వ్యవసాయ పద్ధతులను గురించి వ్యవసాయ/ఉన్నతాధికారి అవగాహన కార్యక్రమం ఏర్పాటుచేస్తే మీరు హాజరు అవుతారా?			
3.	మీరు మీ జీవితాన్ని మార్చుకోవాలి అనుకుంటున్నారా?			
* 4.	రైతు తన తల్లిదండ్రులు చేసినసాగు పద్ధతులనే ప్రయత్నించాలి			
5.	మీరు మీ కొడుకుని ఆదర్శ రైతుగా చూడాలి అనుకుంటున్నారా?			
* 6.	ఈ రోజు సంతోషంగా ఉంటే రేపటిది రేపు చూసుకుందాము అని మీరు భావిస్తున్నారా?			
7.	ఒకవేళ కొత్త వ్యవసాయ పద్ధతిని మీ గ్రామంలో ప్రవేశపెడితే దానిని ఆచరించే మొదటి కొద్దిమందిలో మీరు ఉంటారా?			

11) సామాజిక పాత్ర :

అ. ఈ క్రింది సంస్థలో సభ్యత్వం ఉందా? అవును/కాదు

ఆ. అవును అయితే ఈ క్రింది సమాచారాన్ని తెలుపండి.

క్రసం.	సంస్థ పేరు	సభ్యత్వం	
		సభ్యుడు (2)	సభ్యుడు కాడు (1)
1.	గ్రామ పంచాయతి		
2.	సహకార సంఘాలు		
3.	యువజన సంఘాలు		
4.	రైతు మిత్ర సమూహాలు		
5.	రైతు సంఘాలు		
6.	జన్మభూమి కమిటీ సభ్యుడు		
7.	స్వయం సహకార సంఘాలు		
8.	ఇతరములు		

12) వార్త సాధనాలను సంప్రదించుట :

మీరు వ్యవసాయ సాంకేతిక సమచారాన్ని వివిధ సాధనాల ద్వారా పొందుచుండవచ్చు. ఈ క్రింద ఇవ్వబడిన సాధానలలో ఏ సాధనాన్ని పసుపు సాంకేతిక సమచారాన్ని పొందడానికి ఉపయోగిస్తున్నారో దయచేసి మూడంకెల క్రమానుసారిణిపై వ్యక్తపరచండి.

క్రసం.	వివరము	స్పందన		
		తరచుగా (3)	సందర్భానుసారం (2)	ఎన్నడూ లేదు (1)
1.	రేడియో కార్యక్రమాలు			
2.	టెలివిజన్ కార్యక్రమాలు			
3.	దిన పత్రికలు			
4.	వ్యవసాయ / ఉద్యానవన సంబంధిత పుస్తకాలు			
5.	అన్నదాత మరియు పాడి పంటలు వంటి వ్యవసాయ సంచికలు			
6.	వ్యవసాయ ప్రదర్శనలు మరియు కిసాన్ మేళాలు			
7.	చరవాణి			
8.	అంతర్జాలం			
9.	ఇతరములు			

13) విపణి దృక్పథము :

ఈ క్రింద పొందుపరచబడ్డ వాక్యాలు రైతు యొక్క విపణి దృక్పథాన్ని ప్రతిబింబిస్తాయి. దయచేసి పై వాక్యాలపై మీ యొక్క స్పందనను మూడంకెల క్రమానుసారిణిపై వ్యక్తపరచండి.

క్రసం.	వివరము	స్పందన		
		ఒప్పుకుంటాను (3)	నిర్ణయించలేను (2)	ఒప్పుకోను (1)
1.	విపణి సమాచారం రైతుకు బాగా ఉపయోగపడుతుంది.			
2.	రైతు పసుపు కొమ్ముల విభజన చేయడం వలన మంచి ధరను పొందవచ్చును.			
3.	పసుపు కొమ్ములను నిల్వ చేయడం వలన మంచి ధరను పొందవచ్చును.			
* 4.	రైతు ధరలతో సంబంధం లేకుండా తన దగ్గరున్న మార్కెట్‌లో ఉత్పత్తిని విక్రయించవలెను.			
* 5.	రైతు తనకు కావలసిన ముడిసరుకులను తన బంధుమిత్రులు కొన్న దుకాణాలలోనే కొనవలెను.			
6.	విపణిలో అధిక వినిమయం కలిగిన రకాలను పండించాలి.			

14) ఆర్థిక దృక్పథం :

ఈ క్రింద పొందుపరచబడ్డ వాక్యాలు రైతు యొక్క ఆర్థిక దృక్పథాన్ని ప్రతిబింబిస్తాయి. దయచేసి పై వాక్యాలపై మీ యొక్క స్పందనను ఐదంకెల క్రమానుసారిణిపై వ్యక్తపరచండి.

క్రసం.	సంస్థ పేరు	స్పందన				
		గట్టిగా ఒప్పకుంటాను	ఒప్పకుంటాను	నిర్ణయించలేను	ఒప్పకోను	గట్టిగా ఒప్పకోను
1.	పసుపు రైతు అధిక దిగుబడులు మరియు లాభాలు దిశగా పనిచేయవలెను.					
2.	ఎవరైతే అధిక లాభాలను ఆర్జిస్తారో వారే విజయవంతమైన రైతు.					
3.	రైతు లాభాలను పెంచుకొనుట కొరకు సంప్రదాయ రకాలకంటే అధిక దిగుబడినిచ్చే రకాలను పండించవలెను.					
4.	రైతు అధిక ధనార్జన చేయడానికి దోహదపడే నూతన సాగు ఆలోచనలను చేయాలి.					
5.	ఆర్థిక సాయం లేనిదే రైతు కుటుంబం పురోభివృద్ధి చెందడం కష్టం.					
* 6.	ప్రతి రైతు జీవించుట కొరకై సంపాదించ వలసిందేగానీ ఆర్థికపరమైన అంశాలతో జీవితాన్ని నిర్వచించలేము.					

భాగము -2

ఎంపిక చేయబడిన సాంకేతిక పరిజ్ఞానంపై రైతు యొక్క పరిజ్ఞానం స్థాయి :

అ. ఈ క్రింది వానిలో సరియైన సమాధానాన్ని ఎంపిక చేయండి.

1) దుగ్గిరాల, సలిమ్, టెకూరిపేట మొదలగు పసుపు రకాలు ( )

అ) దీర్ఘకాలిక రకాలు ఆ) స్వల్పకాలిక రకాలు

ఇ) మధ్యకాలిక రకాలు ఈ) ఏదీ కాదు

2) దీర్ఘకాలిక పసుపు రకాల పంట కాలం ( )

అ) 7 నెలలు ఆ) 8 నెలలు ఇ) 9 నెలలు ఈ) 10 నెలలు

3) ఎగుమతి కొరకు ఉపయోగించే పసుపు కొమ్ములో ఉండవలసిన కుర్కుమిన్ ( )

అ) 4 శాతం ఆ) 5.5 శాతం ఇ) 9 శాతం ఈ) 13 శాతం

4) దీర్ఘకాలిక పసుపు రకాలను విత్తుటకు సరైన సమయం ( )

అ) మే మొదటి పక్షంలో ఆ) జూన్ మొదటి పక్షంలో

ఇ) జూన్ రెండవ పక్షంలో ఈ) ఆగస్టు రెండవ పక్షంలో

5) ఆఖరు దుక్కిలో వేయవలసిన పశువుల ఎరువు మోతాదు ( )

అ) 10 టన్నులు ఆ) 5 టన్నులు ఇ) 25 టన్నులు ఈ) 20 టన్నులు

6) విత్తన పసుపు కొమ్ములను రిడొమిల్ ఎమ్ జెడ్ @ 3 గ్రా/లి. ద్రావణంలో విత్తనశుద్ధి కొరకు నానబెట్టు సమయం ( )

అ) 10 ని॥లు ఆ) 20 ని॥లు ఇ) 60 ని॥లు ఈ) 40 ని॥లు

7) ఎకరానికి సిఫార్సు చేయబడిన పసుపు విత్తన మోతాదు ఎంత? ( )

అ) 500 కేజీలు ఆ) 1000 కేజీలు ఇ) 1500 కేజీలు ఈ) 2000 కేజీలు

8) బోదెసాళ్ళ పద్ధతిలో మొక్కకు మొక్కకు మధ్య ఎంత దూరం ఉండాలని సిఫార్సు చేయబడింది? ( )

అ) 45 x 20 సెం.మీ. ఆ) 55 x 30 సెం.మీ.

ఇ) 20 x 20 సెం.మీ. ఈ) 30 x 30 సెం.మీ.

9) దుంప తొలుసు ఈగ ఆశించినప్పుడు ఏ లక్షణాలు కనబడతాయి? ( )

అ) మువ్వ చనిపోతుంది ఆ) మువ్వ వాడిపోతుంది

ఇ) ఆకులు ఎండిపోతాయి ఈ) పైవన్నీ

10) పసుపులో మొలకెత్తే ప్రక్రియ ఎన్ని రోజులకు పూర్తి అవుతుంది ? ( )

అ) నాటిన 20 రోజులకు ఆ) నాటిన 30 రోజులకు

ఇ) నాటిన 85రోజులకు ఈ) నాటిన 45 రోజులకు

11) సిఫార్సు చేసిన కలుపుమందు పెండిమిథాలిన్ మోతాదు ( )

అ) 1 లీ./ఎ. ఆ) 2 లీ./ఎ.

ఇ) 3 లీ./ఎ. ఈ) 0.5 లీ./ఎ.

ఆ) ఈ దిగువ తెలిపిన ఖాళీలను సరియైన సమాధానాలతో పూరించండి.

12) పసుపులో ఎకరాకు సిఫార్సు చేయబడిన నత్రజని ఎరువుల మోతాదు ----------

13) పసుపులో ఎకరాకు సిఫార్సు చేయబడిన భాస్వరం ఎరువుల మోతాదు ----------

14) పసుపులో ఎకరాకు సిఫార్సు చేయబడిన పొటాషియం ఎరువుల మోతాదు ----------

15) ఏ తెగుళ్ళు సోకినపుడు ఆకులు వాడిపోయి, గోధుమ రంగుకు మారి చివరిగా ఎండిపోతాయి. దుంపలు కుళ్ళి, మెత్తబడి, చెడువాసన వస్తాయి ? ----------

16) పాలం నుండి తీసిన కొమ్ములను ఎన్ని రోజుల లోపల ఉడకబెట్టాలి ? ----------

17) పసుపు కొమ్ములను ఉడకబెట్టు ప్రక్రియలో కొమ్ములు పూర్తిగా ఉడికినట్టు గుర్తు ఏంటి? ----------

18) పసుపు కొమ్ములను ఉడికించిన తర్వాత సరిగ్గా ఆరబెట్టకపోతే ఏ తెగుళ్ళు ఆశిస్తాయి? ----------

19) కొమ్ములను మెరుగుపెట్టేటప్పుడు ఆఖరి దశలో ఏ మిశ్రమాన్ని చిలకరిస్తే కొమ్ములు ఆకర్షణీయంగా తయారవుతాయి? ----------

ఇ. క్రింది వాక్యాల్లో తప్పొప్పులను గుర్తించండి.

20) పసుపు కొమ్ములు పూర్తిగా ఉడకడానికి 20 నిముషాల సమయం పడుతుంది. తప్పు/ఒప్పు

21) సిఫార్సు చేసిన నత్రజని, ఎరువులను, కొమ్ములను నాటేటప్పుడు, నాటిన 40, 80 మరియు 120 రోజులకు వెయ్యాలి. తప్పు/ఒప్పు

22) పసుపులో తాటాకుమచ్చ తెగులును కార్బెండిజమ్‌ను పిచికారి చేసి నియంత్రించవచ్చును. తప్పు/ఒప్పు

23) పసుపు కొమ్ములను జూన్ రెండవ పక్షం తర్వాత నాటినట్లయితే దిగుబడి బాగా తగ్గుతుంది. తప్పు/ఒప్పు

24) పసుపు బిందు సేద్యం వ్యవస్థను వాడినప్పుడు లెట్రల్స్ మధ్య దూరం 1 మీ. మరియు ఎమిటర్స్ మధ్య దూరం 60 సెం.మీ. ఉండవలెను. తప్పు/ఒప్పు

25) పసుపులో ఇనుప ధాతు లోపం సరిచేయుటకు ఫెరస్ సల్ఫేట్‌ను 15 రోజుల వ్యవధిలో పైరుపై రెండుసార్లు పిచికారి చేయాలి తప్పు/ఒప్పు

26) పసుపు పంటలో దుంపకుళ్ళు తెగుళ్ళ లక్షణాలు కనబడినప4డు నీటి తడుల మధ్య వ్యవధిని తగ్గించాలి. తప్పు/ఒప్పు

27) ఆకులపై గోధుమ రంగు మచ్చలు కల్గివుండుట ఆకుమచ్చ తెగుళ్ళ లక్షణం. తప్పు/ఒప్పు

ఈ క్రింది వాక్యాలకు సమాధానాలను అవును/కాదు ల ద్వారా తెలియపరచండి.

28) 10 కేజీల జింకు సల్ఫేట్‌ను ఆఖరి దుక్కిలో వేయవలెను. అవును/కాదు

29) బరువైన నేలలో వేసిన పసుపు పంటకు 15-20 నీటి తడులు ఇవ్వాలి. అవును/కాదు

30) పసుపు పంట మే-జూన్ నెలల మధ్యలో కోతకు వస్తుంది. అవును/కాదు

31) పసుపులో తాటాకుమచ్చ తెగుళ్ళను మరియు ఆకుమచ్చ తెగుళ్ళు వేప పిండిని మొక్క మొదళ్ళలో వెయ్యడం ద్వారా నివారించవచ్చు. అవును/కాదు

32) బిందు సేద్యం ద్వారా నీరు ఇచ్చిన పసుపు పంటలో దుంపకుళ్ళు తెగులు ఉధృతి ఎక్కువగా ఉంటుంది. అవును/కాదు

33) పసుపులో దుంప తొలుసు ఈగను 10 కేజిల కార్బోఫ్యూరాన్ 3 జి గుళికలను పొలమంతా సమంగా చల్లడం ద్వారా నివారించవచ్చు. అవును/కాదు

34) పసుపు సాగులో పంట మార్పిడి తప్పనిసరి. అవును/కాదు

భాగము -3

ఎంపిక చేయబడిన పసుపు సాగు సాంకేతిక పరిజ్ఞానంపై రైతు అవలంబించిన స్థాయి :

క్రసం.	సేద్యపు పద్ధతులు	పూర్తిగా అవలంబించాను (3)	కొద్దిగా అవలంబించాను (2)	అవలంబించ లేదు (1)
1.	బరువైన నేలల్లో పసుపును సాగుచేయుట.			
2.	వేసవిలో నేలను 6-8 సార్లు దున్నాలి.			
3.	ఎకరాకు 1000 కె.జి. విత్తన మోతాదు			
4.	నారుమడి పద్ధతిని అవలంబించుట			
5.	విత్తన శుద్ధి : రెడొమిల్ మాలాథియాన్ ట్రైకోడెర్మా విరిడి			
6.	పసుపు పంటను జులై రెండో పక్షంలోపు విత్తుకొనుట			
7.	విత్తే పద్ధతి : బోదసాళ్ళ పద్ధతి			
8.	విత్తే లోతు : 8-12 సెం.మీ.			
9.	దుగ్గిరాల, టకురిపేట, సుదర్శన్ సుగుణ రకాలను విత్తుట			
10.	ఆఖరి దుక్కిలో సిఫారసు చేసిన ఎరువులను వేయుట (10 టన్నుల పశువుల ఎరువు + 10 కె.జి. బింక్ సల్ఫేట్ + 150 కె.జి. సూపర్ ఫాస్ఫేట్ + 25 కె.జి. మ్యూరేట్ ఆఫ్ పొటాష్			
11.	విత్తనం నాటే సమయంలో ఎకరాకి 200 కె.జి. వేప పిండి వేయుట			
12.	విత్తిన 120 రోజుల వరకు పొలంలో కలుపు లేకుండా చేయుట			
13.	దుంప నాటిన మరుసటి రోజు ఎకరాకు పెండిమిథాలిన్ అనే కలుపు మందును 1 లీ. సమానంగా పిచికారి చేయుట			
14.	బరువైన నేలలో 15-20 నీటి తడులు ఇచ్చుట			
15.	బిందు సేద్యం పద్ధతిని వాడుట			
16.	పొలుసు పురుగును నివారించడానికి లీటర్ నీటికి మలాథియాన్ 5 మి.లీ. చొప్పున వాడాలి			
17.	దుంప తొలుచు ఈగ లక్షణాలు కనపడగానే ఎకరాకు 100 కిలోల వేపపిండిని మొక్కల మధ్యలో వేయుట			
18.	దుంపకుళ్ళు తట్టుకునే రకాలైన సుగుణ, సుదర్శనలను సాగుచేయుట			

క్రసం.	సేద్యపు పద్ధతులు	పూర్తిగా అవలంబించాను (3)	కొద్దిగా అవలంబించాను (2)	అవలంబించ లేదు (1)
19.	తాటాకమచ్చ తెగుళ్ళ నివారణకు లీటరు నీటికి ఒక గ్రాము కార్బన్‌డిజమ్ కలిపి 15 రోజుల వ్యవధిలో 2 సార్లు పిచికారి చేయుట			
20.	ఆకుమచ్చ తెగుళ్ళను నివారించుటకు 1 గ్రా. కార్బన్‌డిజమ్ + 1 మి.లీ. ప్రొపికొనజాల్ కలిపి 15 రోజుల వ్యవధిలో 2 సార్లు పిచికారి చేయుట			
21.	మొక్కలు బాగా ఎండి, నేలపై వాలిపోయిన తర్వాత మాత్రమే పసుపు పంటను కోయుట			
22.	పసుపు పంటను యంత్రాల సాయంతో కోయుట			
23.	దుంపను తవ్వి తీసిన 2 నుండి 7 రోజుల లోపల ఉడకబెట్టాలి			
24.	దుంపలను మరియు కొమ్ములను వేరువేరుగా ఉడకబెట్టుట			
25.	తెల్లని నురగ పొంగుతోపాటు పసుపుతో కూడిన మంచి వాసన వచ్చువరకు దుంపలను ఉడకబెట్టుట			
26.	పసుపు కొమ్ములను 45 నుండి 60 నిముషాల వరకు ఉడకబెట్టుట			
27.	పసుపు దుంపలను ఉడకబెట్టడానికి ఆవిరి యంత్రాలను ఉపయోగించుతారా?			
28.	ఉడకబెట్టిన కొమ్ములను 10 నుండి 15 రోజులపాటు ఆరబెట్టాలి			
29.	వండి దుంపలను కృత్రిమంగా యంత్రాల ద్వారా ఆరబెట్టుట			
30.	ఎండబెట్టిన పసుపు కొమ్ములను పాలిషింగ్ చేయుట			
31.	పసుపు కొమ్ములను పరిమాణాన్నిబట్టి గ్రేడింగ్ చేయుట			
32.	పసుపు కొమ్ములను గోదాములో నిల్వకు వాడే గోనె సంచులపై మలాథియాన్ పిచికారి చేయుట			
33.	విత్తన పసుపును ఎటువంటి పరిస్థితుల్లోను ఆరుబయట ఎండ తగిలే చోట నిల్వ చేయరాదు			
34.	ఆన్‌లైన్/ఇ-ట్రేడింగ్ పద్ధతిని ఉపయోగిస్తున్నారా?			

భాగము -4

పసుపు సాగులో అవరోధకాలు

ఈ క్రింద పొందుపరచబడిన సమస్యలలో మీరు ఎదుర్కొంటున్న వాటిని తెలపండి.

ఎ) పసుపు కొమ్ములను నాటుట :

1.
2.
3.
4.

బి) ఎరువులు :

1.
2.
3.
4.

సి) నీటి పారుదల :

1.
2.
3.

డి) సస్యరక్షణ :

1.
2.
3.
4.

ఇ) విపణి వినిమయం :

1.
2.
3.
4.

ఈ) ఆర్థికపరమైనవి

1.
2.
3.

ఉ) కూలీలు

1.
2.
3.

ఊ) కోత కోయుట మరియు నిల్వ చేయుట :

1.

2.

3.

4.

ఋ) ప్రాసెసింగ్ మరియు పోస్ట్ హార్వెస్టింగ్ :

1.

2.

3.

4.

ఌ) విస్తరణ సంబంధమైనవి :

1.

2.

3.

4.

భాగము – 5

పై చెప్పిన సమస్యలను అధిగమించుటకు మీ సలహాలను పేర్కొనండి.

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

రైతు సంతకం

ABSTRACT

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Title of the Thesis	:	**"A Study on knowledge and adoption of turmeric farmers in Guntur district of Andhra Pradesh"**
Degree to which it is Submitted	:	**Master of Science**
Faculty	:	**Agriculture**
Department	:	**Agricultural Extension**
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The output and productivity of any land could be increased by following recommended package of practices, and turmeric is no exception. Turmeric output could be increased if the farmers adopt the recommended package of practices. For increasing the level of adoption farmers need to be convinced about recent production technologies. In this regard, it is imperative to examine the factors which increase their adoption.

An ex-post facto research design was followed to study the knowledge and adoption of turmeric farmers in Guntur district of Andhra Pradesh. The study was conducted in Andhra Pradesh state during the year 2015-16.

Guntur district of Andhra Pradesh was purposively selected, out of 57 mandals, three mandals were selected purposively and four villages were selected from each mandal for the study. Respondents were selected from each village by following proportinate random sampling method, a total of 120 farmers constituted the sample of the study. Data was collected by personal interview method.

For the purpose of statistical analysis of the coded data various statistical tools were used *viz.*, frequency and percentage analysis, ranking, correlation analysis, multiple linear regression analysis, ranking and inclusive class interval.

The detailed analysis of personal, socio-economic and psychological characteristics of farmers indicated that majority of the farmers were middle age (57.00%), had middle school education (30.00%) and semi-medium land holdings (13.67%) with medium level of farming experience (46.67%), family size (61.67%), low farm machinery status (49.16%), medium annual income (52.50%), medium in extension contact (58.33%), agriculture as main occupation (63.30), and coupled with

medium level of innovativeness (59.17%), medium social participation (57.50%), mass media exposure (64.17%), market orientation (55.50%) and economic orientation (60.00%).

The detailed analysis of dependent variables indicated that majority of the farmers had medium level of knowledge (59.17%) and adoption (62.50%).

The study revealed that turmeric respondents had knowledge on the turmeric cultivation technology in following aspects viz., Long duration varieties of turmeric mature by 9 months, fumes with typical odour is the characteristic symptom of completely boiled rhizomes, turmeric varieties Duggirala, Salem and Tekurpet mature by nine months, Main season of harvesting falls in march, decrease in yield is noticed when sowing done after second fortnight of July, The optimum seed rate recommended was 1000 kgs for one acre, Within seven days the harvested rhizomes should be boiled, Iron deficiency can be corrected by spraying ferrous sulphate and citric acid @ 5 gm + 1 gm/ lit, Seed rhizomes are soaked in Ridomil @ 3 gms/lit.of warer, before sowing for time period of 30 min, Turmeric crop can be grown in heavy soils with 15-20 irrigations, the optimum spacing followed in ridges and furrows method was 45 × 20, rhizome fly can be controlled by application of carbofuran granules and the optimum time period required for complete boiling of rhizomes was 30 min, brown spots of various sizes on the upper surface of the young leaves is a symptom of leaf spot, in last ploughing the amount of FYM should be added is 10 tonns.

Out of fourteen selected independent variables nine of them such as age, education, farming experience, extension contact, innovativeness, social participation, mass media exposure and economic orientation showed significant relation with extent of knowledge of recommended practices of turmeric. Remaining variables *viz.*, land holding, family size, farm machinery status, annual income, occupation and market orientation did not show any significant relationship with extent of knowledge at 0.01 level of probability.

The multiple linear regression analysis (MLR) indicated that all the fourteen independent variables put together explained 80.90 per cent of variance in the extent of knowledge of recommended practices; remaining 19.10 per cent due to the extraneous effect of variables at 0.05 level of probability.

The fourteen independent variables namely age, education, farming experience, farm machinery status, annual income, extension contact, innovativeness, mass media exposure and economic orientation had shown significant relationship with the extent of adoption of recommended practices in turmeric. The remaining variables like of land holding, family size, occupation, social participation and market orientation did not show any significant relationship with extent of adoption at 0.01 level of probability.

The multiple linear regression analysis (MLR) indicated that all the fourteen selected independent variables put together contributed 86.50 per cent to the total variance in the extent of adoption; remaining 13.50 per cent due to the extraneous effect of variables at 0.05 level of probability.

The most important constraints encountered by the farmers in turmeric cultivation were; high cost of seed rhizomes, Inadequate availability of manures and fertilizers, followed by high cost of manures and fertilizers, lack of knowledge on dosage of different pesticides and fungicides, high cost of machinery for small and marginal farmers, exploitation by the middle men fluctuations in market price, high wages of labour, non-availability of labour in time and non-availability of advanced steam boilers.

Suggestions given by the farmers to overcome the constraints related to turmeric cultivation were, evolving suitable varieties with rhizome rot resistance, demonstration on seed treatment technique, making timely availability of quality seed material, provision of turmeric processing machinery on subsidy, timely supply of fertilizers, supplying steam boilers on subsidy basis, timely provision of credit facility at lower interest, elimination of middlemen from the turmeric market system, establishment of turmeric research station nearby, technical guidance to the farmers on the advanced production technology, exhibition on turmeric crop should be organised *etc.*

Chapter I

INTRODUCTION

India is known as the legendary land of spices and from the time immemorial India is the 'Home of Spices' producing almost all the spices of the world. Indian spices have been a heart to Indian culture and its fame is much older than Indian history. Spices are the gifts of nature to the people of India. Turmeric is one of the most important spice crops of India and is cultivated from ancients times. The oldest literary records about the use of turmeric in India is found in Atharvanaveda composed in 1400 B.C.

Turmeric (*Curcuma longa* L.) is a herbaceous perennial plant growing up to the height of 60-90 cm. with short stem and native of South Asia particularly India. It belongs to family Zingiberaceae. The plant is propagated through rhizomes. The leaves are long, broad lanceolate and bright green. The flowers are pale yellow and born on dense spikes. The pseudostems are shorter than leaves. The rhizomes were ready for harvesting within 7 to 9 months after plants

India is the largest producer, consumer and exporter of turmeric in the world. Indian turmeric is considered to be the best in the world market because of its high curcumin content. India accounts for about 80 per cent of world turmeric production and 60 per cent of world exports. Out of annual production 93 per cent is consumed within country and remaining 7 per cent is exported. Other major turmeric producers are Pakistan, China, Haiti, Jamaica, Peru, Taiwan and Thailand.

In the year 2014-2015 in India turmeric occupies an area of 184.4 thousand hectares with production and productivity of 1229 million tones and 4.5 MT per hectare respectively *(http://www.indiastat.com).*

In India principle states of turmeric growing are Andhra Pradesh (57%), Tamilnadu (23%), Karnataka (6%), Orissa (4%), Kerala and Maharashtra. After bifurcation of Andhra Pradesh, the area under turmeric was significantly reduced

in newly formed Andhra Pradesh. In Telangana the normal area and production under turmeric is 43,000 ha and 2,16,000 MT, whereas in Andhra Pradesh it is only 16,000 ha and 1,43,000 MT respectively *(http://www.indiastat.com)*. The above trend shows that there is a need to increase the area under turmeric.

Table 1.1 Data on area, production and productivity of turmeric in India (2003-04 to 2013-14)

Year	Area (in '000 hectares)	Production (in '000 MT)	Productivity (in MT/Hectare)
2003-04	153	587	38
2004-05	164	752	46
2005-06	174	870	50
2006-07	179	787	44
2007-08	175	794	45
2008-09	191	877	46
2009-10	184	919	50
2010-11	223	1237	56
2011-12	219	1167	53
2012-13	194	987	51
2013-14	233	1190	51

In Andhra Pradesh, turmeric is mainly cultivated in the districts of Kadapa, Guntur, Krishna, East Godavari, and West Godavari. Guntur district has highest area in Andhra region of Andhra Pradesh with 5013 hectares of cultivated area. The main varieties of turmeric i.e. Duggirala, Tekurpet, Kadapa types have been cultivating by the farmers in these areas since long time. Guntur district is popular for the production of quality turmeric and has a great potential for increasing the production and productivity of turmeric. Keeping in the view, the importance of turmeric, the present study was conducted on the knowledge and adoption of recommended package of practices of turmeric.

Table 2.2 Data on area, production and productivity of major turmeric growing states in India (2014-2015)

Name of the State	Area (in '000 hectares)	Production (in '000 MT)	Productivity (in MT/Hectare)
Andhra Pradesh	16.5	143.2	8.7
Assam	16.6	16.3	1.0
Karnataka	13.4	63.6	4.8
Maharashtra	13.5	32.1	2.4
Tamil Nadu	32.0	117.4	3.7
Telangana	43.5	216.3	5.0
West Bengal	15.8	42.0	2.7
India	**184.4**	**830.4**	**4.5**

Uses of turmeric

Turmeric is used in diversified forms as a condiment, flavouring and colouring agent and as a principal ingredient in Indian culinary as curry powder. It has anti cancer and antiviral activities and hence, finds use in the drug industry and cosmetics industry. 'Kum-kum' popular with every house wife is also by product of turmeric. It finds a place in offering on religious and ceremonial occasions. A type of starch is also being extracted from a particular type of turmeric. The increasing demand for natural products as food activities makes turmeric as ideal produce as a food colourant.

As a medicine turmeric has been used in Ayurvedic system of medicine in India from times immemorial. It is claimed to be a stomaching tonic, blood purified, antiseptic, antiacid, antiperiodic and carminative. In India companies like Godrej, Vicco are engaged in manufacturing different new products from turmeric like soaps, anticeptics, cosmetics, *etc*.

Objectives of the study

1. To study the personal, socio-economic and psychological characteristics of turmeric farmers.
2. To find out the extent of knowledge and adoption of farmers practices on turmeric production technology.
3. To unearth the relationship between personal, socio-economic and psychological characteristics of turmeric farmers with their knowledge and adoption levels.
4. To present few case lets of successful turmeric farmers.
5. To identify the constraints faced by the farmers in turmeric cultivation and to elicit their suggestions for improvement.

Scope of the study

The present investigation was undertaken to measure the level of knowledge of the farmers regarding various production recommendations in turmeric cultivation and the extent of adoption of these production recommendations by the farmers. Besides this, the study was also focused to reveal the relationship of personal, socio-economic and psychological characteristics of turmeric farmers with their level of knowledge and adoption of selected production technologies and finally an attempt has been made to identify the constraints in adoption of production recommendations in turmeric cultivation by farmers individually were also studied by applying an ex-post-facto research design.

The findings could be utilized by administrators, scientists and the personnel of department to understand the existing status of turmeric farmers knowledge and adoption behaviour of recommended package of practices and constraints faced in adoption of Turmeric production technologies which will facilitate in planning and organizing effective educational programmes to increase Turmeric production. The results of the study could be effectively used in other areas where similar conditions exist.

Limitations of the study

1. Being a postgraduate research, the investigator has limitations of time, money and other resources.

2. Since the study was designed as on ex-post-facto type, the memory bias on the part of the respondents cannot be ruled out.

3. The area of investigation was restricted to twelve villages in three mandals. Therefore the implications made in the study may not be generalized for larger areas.

Presentation of the study

The report of the study is presented in six chapters.

- The first chapter deals with brief “Introduction”, highlights the objectives, scope and limitations of the study.

- The second chapter “Review of Literature” deals with the review of available and related studies in the light of the present investigation.

- The third chapter deals with the “Material and Methods” giving the details of the ‘Methodology’ used in the process of investigation. It provides the information on location of the study, selection of the respondents and sampling procedure, selection of variables and their empirical measurement, devices and methods used for collection of data and statistical tools used.

- “Results and Discussion” along with illustrations were placed in fourth chapter.

- The fifth chapter highlights “Summary and Conclusions” with implications of the study.

- The “Literature Cited” is presented by following the guidelines of “ANGRAU” on thesis presentation. “Appendices” were provided at the end.

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***Original not seen**

Note: The pattern of literature cited above is in accordance with the guidelines for thesis presentation Acharya N.G. Ranga Agricultural University, Lam, Guntur.

Chapter III

MATERIAL AND METHODS

The present research was carried out with an objective, to study the extent of knowledge and adoption and constraints faced by the Turmeric farmers in Guntur district of Andhra Pradesh. This chapter deals with the methodology used for investigation. The research methodology followed is described under the following heads.

3.1 Research design

3.2 Sampling procedure

3.3 Operationalization and measurement of the variables

3.4 Eliciting Problems and Suggestions

3.5 Instruments used for data collection

3.6 Statistical tools used

3.7 Hypothesis

3.1 RESEARCH DESIGN

Ex-post Facto research design was followed to achieve the objectives of the study as the variables had already occurred. According to Kerlinger (1973), the ex-post-facto research is that research in which the independent variable or variables have already occurred and in which the respondents start with the observation of a dependent variable or variables. Then, studies the independent variables in retrospect for their possible relationship to and effect on the dependent variables. The researcher, thus examines retrospectively the effects of a naturally occurring event on a subsequent outcome with a view to establishing a causal link between them.

3.2 SAMPLING PROCEDURE

3.2.1 Locale of the Study

Andhra pradesh State occupies second place in turmeric cultivation after Telangana and also researcher belongs to this state and he is familiar with the local language which would help in building better rapport with the farmers.

3.2.2 Selection of District

Guntur district was selected purposively as it occupies area of Turmeric cultivation in Andhra region of Andhra Pradesh.

3.2.3 Selection of Mandals

Out of 57 mandal of Guntur district three mandals having maximum area under turmeric crop *viz.,* Kollipara, Duggirala, and Bhattiprolu were selected purposively.

3.2.4 Selection of Villages

Four villages from each selected mandal were selected based on maximum area of cultivation of turmeric crop thus making a total of 12 villages.

3.2.5 Selection of Respondents

The farmers were selected based on proportianate random sampling procedure, from 12 villages constituting the total sample of 120 respondents.

Table 3.1.Particulars of selected mandals, villages and Turmeric farmers

S.No.	Name of the mandal	Name of the village	Total no. of turmeric growers	Number of respondents
1.	Kollipara	Munnangi	661	12
		Kollipara	505	5
		Vallabhapuram	380	3
		Bommuvaripalem	554	12

2.	Duggirala	Chinnapalem	531	11
		Emani	558	13
		Peddakonduru	504	12
		Tummapudi	438	8
3.	Bhattiprolu	Peddalanka	637	16
		Pesarlanka	618	15
		Vellaturu	435	8
		Peddapulivarru	407	5
	Total		**3628**	**120**

3.3. OPERATIONALIZATION AND MEASUREMENT OF THE VARIABLES

The variables for the study were selected based on the relevant review of literature on the subject, in consultation with experts in the field of research and extension, members of advisory committee. The selected variables and their empirical measurement were furnished in Table 3.2

Table 3.2. Empirical measurement of the variables selected for the study

S. No.	Variables	Instrument used for the study
Dependent Variables		
1.	Knowledge	Test developed for the study
2.	Adoption	Schedule developed for the study
Independent Variables		
1.	Age	Chronological age of the respondents in completed years.
2.	Education	Scale developed by Venkataramaiah (1983) with suitable modifications.
3.	Land holding	Scale developed by Venkataramaiah (1983) with suitable modifications.
4.	Farming Experience	Schedule developed for the study.
5.	Family size	Schedule developed for the study
6.	Farm machinery status	Schedule developed for the study.

7.	Annual income	Scale developed by Ramamurthy (1983) with suitable modifications.
8.	Extension contact	Scale developed by Ponnappan (1982) with suitable modifications.
9.	Occupation	Schedule developed for the study.
10.	Innovativeness	Scale developed by Rao (1985) with suitable modifications.
11.	Social participation	Scale developed by Trivedi (1963) with suitable modifications.
12.	Mass media exposure	Scale developed by Seshachar (1980) with suitable modifications.
13.	Market orientation	Scale developed by Samantha (1969) with suitable modifications.
14.	Economic orientation	Scale developed by Supe (1969) with suitable modifications.

3.3.1 Dependent Variables

3.3.1.1 Knowledge

Knowledge includes all those behavior and test situations, which emphasized the remembering either by recognition or recall of ideas, materials or phenomena (Bloom *et al.* 1956). The main objective of the study was to find out the level of knowledge of turmeric growers on selected production technology.

Test is an organized succession of stimuli, designed to measure quantitatively or to evaluate qualitatively some material process, trait or characteristic (Bean, 1953). An appropriate knowledge test helps us to know the level of relevant knowledge of the participants from time to time. Knowledge test score was also used as a variable to test its relationship with other variables (Ray and Mondal, 2011).

3.3.1.1.1 Construction and standardization of knowledge test

The main intention of the knowledge test was to identify the level of knowledge of turmeric growers on selected production technology. The details of the standardization of the items were as follows.

3.3.1.1.2 Collection of knowledge items

The content of the test was composed of items asked in the form of questions. The important factors considered for collecting the items for knowledge test was to determine and classify the object to be measured by taking care of the respondents abilities. Items were collected from different sources like printed literature on package of practices, recommendations of Acharya N G Ranga Agricultural University through ZREAC proceedings of the zone and Vyavasaya Panchangam, package of practices available through printed literature in agricultural information materials of DAATTC and KVK, Guntur, Horticultural Research Station (HRS), Guntur, and recommendations of State Department of Agriculture, Department of Horticulture, Farmers Training Centre (FTC) and Agricultural Technology Management Agency (ATMA).

3.3.1.1.3 Judges rating

The items were given in the form of statements to the judges in relevant field for finding out the degree of relevancy of the items to include in the final schedule or not. The items were selected by adopting weighted mean score method. Crop specialists were selected from Horticulture Research Station, Guntur, Horticultural Officers, Agricultural Officers, Scientists of KVK and DAATTC from the respective district. The scores of each statement was summed up to find out the total score of each statement for all the 20 judges. The statement under most relevant, relevant and least relevant were given weightage 3, 2 and 1, respectively. The mean score assigned to each statement was calculated by using the following formula.

$$\text{Mean score} = \frac{\text{Total score of each statement}}{\text{Total No.of judges}}$$

After calculating the mean score for all the statements, overall mean score was calculated by adopting the following formula.

$$\text{Over all mean score} = \frac{\text{Total score of all the statements for all the judges}}{\text{Total No.of statements X Total No.of judges}}$$

The overall mean score was found to be 2.03. The statements with their mean score values being equal to or higher than over all mean score, were selected for the final knowledge test (See Appendix II).

3.3.1.1.4 Selection of items for item analysis

i. The selection of items was done on the basis of the following criteria.

ii. Response to items should promote thinking rather than rote memorization.

iii. They should differentiate the well-informed turmeric growers from the less informed and should have certain difficulty value.

iv. The items included should cover all areas of knowledge about selected production technology of turmeric.

It means that the items which are not well understood by the turmeric growers and items which can be correctly replied by all or none are not suitable for knowledge test. That is, the item should be able to discriminate the well informed turmeric growers from the poorly informed ones.

3.3.1.1.5 Framing of test items

Initially, 85 knowledge items were collected from different sources for developing test after editing carefully. The items were then framed into objective form of questions namely multiple choice, fill in the blanks, true or false and yes or no and therefore the assessment was objective and impersonal. The particulars on type of questions were furnished in the Appendix II.

3.3.1.1.6 Pre-testing

The items selected for the knowledge test were pretested separately by administering the items to 30 turmeric growers (selected at random). Care was taken to see that 30 turmeric growers selected for this purpose were outside the main sample of this study in the non-sampled area.

3.3.1.1.7 Item analysis

The item analysis was carried out to yield two kinds of information viz., indices of 'Item Difficulty' and 'Item Discrimination'. The index of item difficulty indicates the extent to which an item was difficult. The latter provides information on how well an item measures or discriminates a well-informed turmeric growers from poorly informed turmeric growers.

For item analysis, response obtained for multiple choice, fill in the blanks, 'true' or 'false' and 'yes' or 'no' questions were arranged with a score of 'One' and 'Zero' for correct and incorrect responses respectively. After computing the individual total score for 30 turmeric growers, they were arranged in descending order based on total score. Then they were divided into 6 equal groups arranged in descending order of total score obtained by them. These groups were named as G_1, G_2, G_3, G_4, G_5 and G_6 with 5 respondents in each group. For item analysis, the middle 2 groups G_3 and G_4 were eliminated keeping only 4 extreme groups, with high scores namely G_1 and G_2 and low scores namely G_5 and G_6. After getting the four extreme groups for item analysis, the responses for each of the items were subjected to calculate difficulty index, discrimination index and point biserial correlation as shown below.

3.3.1.1.7.1 Item difficulty index (P)

The item difficulty index was worked out as the percentage of the turmeric growers answering an item correctly. The assumption of the item statistic of difficulty index was that, the difficulty is linearly related to the level of knowledge of turmeric growers on selected production technology. It was computed by the following formula.

$$\text{Difficulty Index} = \frac{\text{No.of turmeric growers answered correctly}}{\text{Total No.of turmeric growers}} \text{ x } 100$$

The items with 'P' values ranging from 20 to 80 were considered for the final selection of the knowledge test to avoid the extremely simple and difficult items which distort the required homogeneity and discrimination. The values of the difficulty index for the knowledge items on selected production technology of turmeric are presented in Appendix III.

3.3.1.1.7.2 Discrimination index ($E^{1/3}$)

The item discrimination index ($E^{1/3}$), which indicates the level of discrimination between well informed and poorly informed turmeric growers, was computed using the formula given below.

$$\text{Discrimination Index } (E^{1/3}) = \frac{(S1+S2)-(S5+S6)}{N/3}$$

Where,

S_1, S_2, S_5 and S_6 are the frequencies of correct answers in groups G_1, G_2, G_5 and G_6, respectively.

N is the total number of turmeric growers of the sample selected for the item analysis i.e., 30.

The items with $E^{1/3}$ values ranging from 0.20 to 0.80 were selected for the final test (See Appendix III). The value of the discrimination index for the knowledge items on selected production technology of turmeric are presented in Appendix III.

3.3.1.1.7.3 Point biserial correlation

Point Biserial Correlation (rpbis) is the test validation in which the criterion of validity is considered to be internally consistent. That is, the relationship of the total score to a dichotomized response to any given item. In a way, the validity power of the item was computed by the correlation of the individual item of preliminary knowledge test was calculated. An item by item computation of point biserial correlation was calculated by using the following formula suggested by Garret (1966).

$$\text{rpbis} = \frac{MP - MQ}{SD} \text{ X } \sqrt{PQ}$$

Where,

rpbis = Point biserial correlation

MP = Mean of the total scores of the turmeric growers who answered the items correctly

(or)

$$MP = \frac{\text{Sum of total of XY}}{\text{Total No.of correct answers}}$$

MQ = Mean of the total scores of the turmeric growers who answered the items incorrectly

(or)

$$MQ = \frac{\text{Sum total of X} - \text{Sum total of XY}}{\text{Total No.of wrong answers}}$$

SD = Standard deviation of the entire sample (30No.s)

P = Proportion of the turmeric growers giving correct answer to the item

(or)

$$P = \frac{\text{Total No.of correct answers}}{\text{Total No.of turmeric growers}}$$

Q = Proportion of the turmeric growers giving incorrect answer to the item

(or)

Q = 1-P

X = Total score of the turmeric grower for all items

Y = Response of the turmeric grower for the specific items

(Correct = 1, Incorrect = 0)

t-test

$$t = \frac{\text{rpbis } \sqrt{N-2}}{\sqrt{1-rpbis^2}}$$

Where,

rpbis = Point biserial correlation

N = Total number of respondents of the sample selected for the item analysis

3.3.1.1.8 Total items selected

Out of 85 items, 34 items were finally selected based on the following criteria.

1. Items with difficulty level indices ranging from 20 to 80.
2. Items with discrimination indices ranging from 0.20 to 0.80.
3. Items with mean score above 2.03.

All important components of the selected production technology have been covered. The questions were prepared in such a way that no important component has been left out.

The finally selected knowledge test items comprised of four types of questions viz., Multiple choice (11 Nos.), Fill in the blanks (8 Nos.), True or False (8 Nos.) and Yes or No (7 Nos.) totaling to 34 items of test battery on knowledge of selected production technology of turmeric crop (See Appendix IV).

3.3.1.1.9 Reliability of the test

Reliability of the items was tested by split half method. The scores obtained by odd numbers of turmeric growers were taken as one set of values and the scores of even numbers of turmeric growers as the second set of values for calculating the correlation coefficient. The correlation co-efficient (r= 0.80) was highly significant indicating a high degree of dependability of the instrument for measuring knowledge of the turmeric growers.

3.3.1.1.10 Validity of the test

The content validity of the knowledge test was derived from a long list of test items representing the whole universe of recommended package of practices pertaining to turmeric collected from various sources as discussed earlier and includes materials from literature, experts opinion, members of advisory committee, findings of past work and discussions with extension workers, officials of the Department of Horticulture and progressive farmers. It was assumed that the score obtained by administering the knowledge test of this study, measures what was intended to measure. Thus, knowledge test developed in the present study measures the knowledge of selected production technology of turmeric growers as it showed a greater degree of reliability and validity.

3.3.1.1.11 Scoring pattern

The selected knowledge test items included four types as multiple choices, fill in the blanks, true or false and yes or no. The correct response to each test item was given a score of ‘2’ and incorrect response a score of ‘1’ that the knowledge score of a turmeric grower is the summation of scores of correctly answered items out of total test items. The possible knowledge score ranged from ‘34’ to ‘68’.

3.3.1.1.12 Administration of the test

Each item in the knowledge test was read out to the selected turmeric growers in translated version (Telugu) by the investigator and the responses in the form of correct or incorrect answers were recorded.

3.3.1.1.13 Categorization

Based on the scores obtained, the turmeric growers were classified into the following three categories based on the mean and standard deviation as shown below.

S.No.	Category	Score Range
1.	Low level of Knowledge	< Mean – S.D
2.	Medium level of Knowledge	Mean ± S.D
3.	High level of Knowledge	> Mean + S.D

3.3.1.2 Adoption

It is a decision to make full use of an innovation as a best course of action available (Rogers, 1983).

Adoption is the acceptance and application of one or all the practices pertaining to selected production technology by a turmeric grower. All the practices included in selected production technology considered important. Partial adoption refers to deviation from the adoption of a selected production technology. The practice which was not adopted by the turmeric growers was considered as non adoption. A range of adoption was provided for these practices facilitating adjustments based on local conditions.

The extent of adoption of selected production technology by the turmeric growers was measured by using a structured schedule developed for turmeric growers in consultation with experts, viz., Scientists of Horticultural Research Station, Guntur, Subject Matter Specialists of KVK, Scientists of DAATTC, Officials of Department of Agriculture and Horticulture of Guntur district, Teachers of Department of Agronomy, Entomology, Horticulture, Pathology, Agricultural Extension of Agricultural college, Bapatla. Schedule was developed for measuring the extent of adoption of turmeric growers.

All the 34 practices pertaining to selected production technology of turmeric crop included in the schedule were administered to the turmeric growers after pre-testing and the responses of turmeric growers as adopted, partially adopted, and not adopted were obtained against each of the recommended practices and weights of 3, 2 and 1 were assigned, respectively.

Thus, the total score on all the practices was computed by summing up the scores of all the items. The maximum and minimum possible adoption scores were 102 and 34, respectively.

Based on the adoption scores obtained, turmeric growers were then grouped into three categories as shown below using mean and standard deviation.

S.No.	Category	Score Range
1	Low level of Adoption	< Mean – S.D
2	Medium level of Adoption	Mean ± S.D
3	High level of Adoption	> Mean + S.D

3.3.2 Independent variables

A total of 14 independent variables were selected according to the respondents personal, socio-economic and psychological characteristics. They are operationalized as follows.

3.3.2.1 Age

The age of the respondents was operationalized as number of years completed by the respondent at the time of investigation. The respondents were grouped into three categories based on responses, viz., young (< 35 years), middle (36 -58 years) and old (>58 years). The scoring pattern adopted is as follows.

S.No.	Category	Age	Score
1.	Young	Less than 35 years	1
2.	Middle	36 to 58 years	2
3.	Old	More than 58 years	3

3.3.2.2 Education

Education of a turmeric grower was operationalized as the extent of formal education received at the time of investigation. Scoring was done on the basis of Socio-Economic Scale developed by Venkataramaiah (1983) revised (1990) with suitable modifications. The maximum and minimum obtainable scores were 7 and 1, respectively. The selected turmeric growers were categorized as given below.

S.No.	Category	Scores
1.	Illiterate	1
2.	Primary school	2
3.	Middle school	3
4.	High school	4
5.	Intermediate education	5
6.	Graduation	6
7.	Post Graduation	7

3.3.2.3 Land holding

The land holding has been operationalized as the number of standard in hectares of land possessed by the respondent at the time of enquiry. The standard units of land holding has to be calculated by equating two and half acres of dry land to one acre of garden or one acre of wet land. The information about land holding may be obtained in terms of acres and converted to hectares by considering one acre equal to 0.405 hectares.

To calculate the individual respondent's land holding, the scoring pattern adopted by Venkataramaiah (1983) was as given below.

Category	Holdings	Score
Land less (no land)	0	1
Marginal farmers	<0.1-1.0 hectares	2
Small farmers	1.1-2.0 hectares	3
Semi-medium farmers	2.1-4.0 hectares	4
Medium	4.1-10.0 hectares	5
Large farmers	>10 hectares	6

3.3.2.4 Farming experience

Number of years of experience of selected turmeric growers had in Turmeric cultivation was considered for measuring this variable. Scoring was done on the basis of schedule developed by Venkataramaiah (1983) revised (1990). The minimum and maximum scores obtained were one and five, respectively. The score one was given to those turmeric growers who had 1-5 years of farming experience. Whereas, those turmeric growers had farming experience of 6-10, 11-15, 16-20, more than twenty years of farming experience were given a score of two, three, four and five, respectively.

Based on the scores obtained, the selected turmeric growers were classified into three groups by using mean and standard deviation.

S.No.	Category	Score Range
1.	Low farming experience	< Mean – S.D
2.	Medium farming experience	Mean ± S.D
3.	High farming experience	> Mean + S.D

3.3.2.5 Family size

Family size was considered as the number of members in the selected turmeric grower family. Socio-Economic Scale developed by Venkataramaiah (1983) revised (1990) with modifications was used to measure this variable. The items included and scoring pattern followed was given below.

S.No.	Family Size	Score
1.	Small (1 to 3 members)	1
2.	Medium (4 to 6 members)	2
3.	Large (7 to 9 members)	3
4.	Very large (More than 9 members)	4

3.3.2.6 Farm machinery status

The farm implements and machinery status is operationalized as the number machinery *viz.*, spade, iron plough, sprayer, turmeric polisher, tractor, mechanical harvester and steam boiler.

S.No.	Possessions Category	Score
1.	Spade	1
2.	Iron plough	2
3.	Sprayer	3
4.	Turmeric polisher	4
5.	Tractor	5
6.	Mechanical harvester	6
7.	Steam boiler	7

one score was assigned to each farm implement and machinery possessd by the individual farmer. The maximum and miniumum scores obtained were 1 and 7, respectively. The total score of each farmer is worked out by summing up individual scores of all farm machinery possessed by the individual farmers. The respondents were grouped into following three categories i.e, low farm machinery, medium farm machinery and high farm machinery based on class interval technique.

S. No.	Category	Range
1.	Low farm machinery status	1-3
2.	Medium farm machinery status	3-5
3.	High farm machinery status	5-7

3.3.2.7 Annual income

Annual income was operationalized as the total income earned by the turmeric grower in one year from different sources of agricultural and allied occupations like farming, dairy and poultry *etc.* Scale developed by Rama

Murthy (1983) with suitable modifications was used to compute this variable. It was categorized as up to Rs.30,000/- (1), Rs.30,000-60,000/- (2), Rs.60,000-90,000/- (3), Rs.90,000-1,20,000/- (4), Rs.1,20,000-1,50,000/- (5) and above Rs.1,50,000/- (6) respectively. The maximum and minimum score obtained was 1-6. After obtaining scores, the selected turmeric growers were categorized into three groups based on mean and standard deviation as given below.

S.No.	Annual Income Category	Score Range
1.	Low annual income	< Mean – S.D
2.	Medium annual income	Mean ± S.D
3.	High annual income	> Mean + S.D

3.3.2.8 Extension contact

Extension contact was operationalised as the degree to which an individual contact extension persons or agencies for getting information on various crops in Agriculture.

It was be quantified as per the measurement developed by Ponnappan, (1982) with suitable modifications. The variable was measured in terms of frequency of contact the individual maintain with the contact agents like village secretary, AEO, MAO, ADA, HO, ADH, ANGRAU scientists and any other etc. The scoring procedure was followed frequently, sometimes, rarely with scores of 3, 2 and 1. The minimum and maximum score of each respondent were 10 and 30 respectively. By adding the scores of all items, the individual total score was worked out.

The respondents were categorized into three groups based on the mean and standard deviation.

S.No.	Category	Score Range
1.	Low extension contact	< Mean – S.D
2.	Medium extension contact	Mean ± S.D
3.	High extension contact	> Mean + S.D

3.3.2.9 Occupation

Occupation was operationalized as the nature of job held by the selected turmeric grower at the time of investigation. The selected turmeric growers were categorized based on their occupational patterns given below.

S.No.	Occupation	Score
1.	Agriculture	1
2.	Agriculture + Animal Husbandry	2
3.	Agriculture + Labour	3
3.	Agriculture + Employee	4
4.	Agriculture + Business	5
5.	Agriculture + Others	6

3.3.2.10 Innovativeness

Innovativeness was operationalised as the degree to which an individual adopts new idea relatively earlier than other members in his social system.

This variable was measured with Rao (1985) scale with suitable modifications. This scale consists of 7 items, among them five were positive items and two were negative items. In this scale each item was rated on a three point continuum-agree, undecide and disagree. A score of 3, 2 and 1 was given for positive items and the scores were reversed in case of negative statements.

The maximum and minimum possible score for innovativeness was 21 and 7, respectively. Based on the total obtained scores, the respondents were categorized into 3 groups based on mean and standard deviation.

S.No.	Category	Score range
1	Low level of innovativeness	< Mean – S.D
2	Medium level of innovativeness	Mean ± S.D
3	High level of innovativeness	> Mean + S.D

3.3.2.11 Social participation

It was defined as the degree of involvement of the selected turmeric farmers in formal organizations either as a member or an office bearer. It was measured by using the Socio-Economic Scale developed by Trivedi (1963) with suitable modifications. The maximum and minimum score for selected turmeric growers were '21' and '7', respectively.

S. No.	Name of the Organization	Membership	
		Member (2)	Non-member (1)
1.	Gram panchayat /Gramasabha		
2.	Co-operatives		
3.	Youth clubs		
4.	Rytu Mitra Groups		
5.	Farmers Association Association		
6.	Janmabhoom committee		
7.	Self Help group		

Based on the scores obtained, the selected turmeric growers were classified into three groups by using mean and standard deviation.

S.No.	Category	Score Range
1.	Low social participation	< Mean – S.D
2.	Medium social participation	Mean ± S.D
3.	High social participation	> Mean + S.D

3.3.2.12 Mass media exposure

It was operationlized as the extent of exposure of respondents to the Mass media such as radio, television, news papers, Agricultural books, information materials and Farm magazines etc.

Mass media exposure scale was developed by Seshachar, (1980) used with suitable modifications. It consists of eight statements used to know the frequency of exposure was measured as daily, occasionally and rarely with the scores of 3, 2 and 1 and the minimum and maximum scores of each respondent were 8 and 24, respectively.

S.No.	Category	Score Range
1.	Low mass media exposure	< mean –S.D
2.	Medium mass media exposure	Mean ± S.D
3.	High mass media exposure	> Mean + S.D

3.3.2.13 Market orientation

Market orientation was operationalized as the judgment of turmeric grower to sell his produce for better price by analyzing the various prevailing infrastructural and market intelligence. The scale developed by Samantha (1977) with suitable modifications was used and it consists of six statements out of which first three and last ststements were positive and the fourth anf fifth were negative. The individual response was obtained on three point continuum for each statement i.e. Agree (A), Undecided (UD) and Disagree (DA) with weightages of 3, 2 and 1, respectively and was reversed for negative statements.

The score obtained for each statement was summed up to get each turmeric grower market orientation score. The maximum and minimum possible score was '18' and '6', respectively. Based on scores obtained, the turmeric growers were categorized into three groups based on mean and standard deviation.

S.No.	Category	Score Range
1.	Low market orientation	< Mean – S.D
2.	Medium market orientation	Mean ± S.D
3.	High market orientation	> Mean + S.D

3.3.2.14 Economic orientation

It was operationalized inclination of turmeric grower to maximize his profit and relative value he assigned for economic ends.

The degree of economic orientation of the turmeric grower was measured with the help of economic orientation scale developed by Supe (1969) with suitable modifications. The scale consisted of six statements out of which first five were positive and the sixth was negative.

The responses of turmeric growers were obtained against each statement in terms of agreement and disagreement with five point continuum. The positive statements were scored 5, 4, 3, 2, and 1 for Strongly agree (SA), Agree (A), Undecided (UD), Disagree (DA) and Strongly disagree (SDA), respectively. Whereas, the scoring system was reversed in case of negative statement.

The score obtained on each statement was summed up to get individual turmeric grower economic orientation. The maximum and minimum possible score was '30' and '6', respectively. Based on the obtained scores, they were categorized into three groups based on mean and standard deviation.

S.No.	Category	Score Range
1.	Low economic orientation	< Mean – S.D
2.	Medium economic orientation	Mean ± S.D
3.	High economic orientation	> Mean + S.D

3.4 ELICITING PROBLEMS AND SUGGESTIONS OF FARMERS IN TURMERIC CULTIVATION

In order to acquire the problems faced by the farmers in adoption of recommended practices of turmeric and suggestions to overcome the problems an open ended schedule was developed and the farmers were asked to indicate problems and suggestions based on their experience. The problems and suggestions were ranked based on frequency and per centage.

3.5 INSTRUMENTS USED FOR DATA COLLECTION

A well structured interview schedule is used as the instrument for data collection. For the preparation of interview schedule, the investigator had a thorough discussion with advisory committee. Keeping in view the objectives, based on relevant literature, discussion with researchers, extension specialists and field extension personnel, Horticulture scientists, with regard to selected production technology of turmeric, a structured interview schedule was developed. It was made sure that the questions were correctly understood by the turmeric growers as a whole. Schedule was translated in Telugu (Appendix-IV) by the investigator prior to actual investigation.

The interview schedule consisted of 5 parts. Part-I consisted of primary information and personal, socio-economic and psychological characteristics of turmeric growers. Part-II pertaining to level of knowledge on selected turmeric production technology, Part-III consisted of extent of adoption of selected turmeric production technology. Part-IV related to constraints and Part-V pertaining to suggestions of turmeric growers for arriving at the strategy for increasing the production.

3.5.1 Pre-Testing

The pilot study was conducted before the final use of Interview Schedule for data collection. The schedule was pre-tested with 25 per cent of the turmeric growers in the non-sample area.

After analyzing the pre-testing results, necessary modifications were done in the interview schedule regarding the wordings and statements by duly avoiding ambiguous and irrelevant items. The interview schedule was presented in the Appendix-IV. The data collected was coded, classified and tabulated in order to make the findings meaningful. The findings were suitably interpreted and necessary conclusions and inferences were drawn.

3.5.2 Establishing Rapport

Necessary rapport with respondent farmers was very important step in any research study. First few days were devoted to get acquainted with the farmers selected for the study by making friendly visits to the study area. All these methods helped researcher in getting the desired co-operation in addition to getting valid and reliable information.

3.5.3 Method of Data Collection

Each respondent farmer was interviewed personally in Telugu by the investigator and their responses were recorded on interview schedule immediately.

3.6 STATISTICAL TOOLS USED

To convert the results into findings few statistical tests were used as given below for analyzing the data

1. Class interval
2. Ranking
3. Arithmetic mean ($\overline{X}$)
4. Standard deviation (σ)
5. Frequency and percentage
6. Correlation analysis (r)
7. Multiple Linear Regressions (MLR)

3.6.1 Class Interval

Inclusive method of class interval was used to categorize certain variables. Class interval is difference between the upper and lower limit of a class and is calculated using the following formula.

$$C.I = \frac{\text{Maximum score} - \text{minimum score}}{\text{No. of classes}}$$

Under exclusive type of class intervals, the items whose values are equal to the upper limit are grouped in the next higher class.

3.6.2 Arithmetic Mean ($\overline{X}$)

It is defined as the sum of all values of the observations divided by the total number of observations. Symbolically it is represented as $\overline{X}$.

$$\text{Arithmetic mean } (\overline{X}) = \frac{\Sigma xi}{n} = \frac{x_1 + x_2 + ...x_n}{n}$$

Where

$\overline{X}$ = Arithmetic mean

xi = Value of ith item of x

Where,

i = 1,2……n

n = Total numbers of respondents

3.6.3 Standard Deviation (S.D)

It is positive square root of the mean of the squared deviations taken from arithmetic mean. It is represented by symbol σ.

$$\text{SD}(\sigma) = \sqrt{\frac{1}{n}\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right]}$$

Σx^2 = Sum of squares of observations

$(\Sigma x)^2$ = Square of sum of 'x' values

n = number of observations.

3.6.4 Frequency and Percentage

Frequency and percentages were used to know the distribution pattern of the respondents according to the objectives under study.

Percentages were used for standardization of sample size by calculating the number of individual that would be under the given category if the total number of individuals were 120.

3.6.5 Correlation Analysis

This test was used to study the relationship between the scores of independent variables and the scores of dependent variables. Correlation coefficient was calculated to find out the degree of relationship between two variables X and Y by using the following formula.

$$r = \frac{\Sigma xy - \frac{\Sigma x \Sigma y}{n}}{\sqrt{\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right]\left[\Sigma y^2 - \frac{(\Sigma y)^2}{n}\right]}}$$

r = Correlation coefficient

Σx = Sum of scores of independent variable

Σy = Sum of scores of dependent variable

Σx^2 = Sum of the squares of scores of an independent variable

Σy^2 = Sum of the squares of scores of a dependent variable

Σxy = The sum of productivity of x and y

n = Size of the sample

The calculated 'r' value was verified for its by using 'r' table value for 5 per cent and 1 per cent level of significance at n –2 degrees of freedom.

3.6.6 Multiple Linear Regression (MLR)

Multiple linear regression analysis was used to study the effect of independent variables on dependent variables. The following multiple linear regression equation was fitted to the data having 8 parameters.

$$Y=a+b1X1+b2X2.....bnXn$$

Where 'a' was the intercept or constant and b_i's are partial regression coefficients.

$$b_i = b_1, b_2, \ldots\ldots b_8$$

The regression coefficient b_i's were tested for their significance with the following formula.

$$t_{(n-k-1)} = \frac{|b_i|}{S.E(b_i)}$$

Where

n = Number of respondents

k = Number of independent variables

S.E (b_i) = standard error of i^{th} partial regression coefficient

b_i = i^{th} Partial regression coefficient

t = Test for significance

df = Degrees of freedom

Coefficient of multiple determinations (R^2) was given by

$$R^2 = \frac{\text{Regression sum of squares (RSS)}}{\text{Total sum of squares (TSS)}}$$

Where

RSS = $b_1\Sigma x_1 y + b_2\Sigma x_2 y + \ldots\ldots\ldots\ldots b_8\Sigma x_8 y$

and TSS = Σy^2

R^2 value is less than unity where it was expressed in percentage. It measures the extent of variation in dependent variable (y), which can be explained by the independent variables *(x_i)* together.

The above statistical techniques were applied with the help of SPSS 16.0.

3.7 HYPOTHESIS

Hypothesis is a guess, a hunch or an assumption of the existence of some facts, which serve to explain the connection of facts in a given situation. Hypothesis guides the researcher through the bewildering jungle of facts to shift, select and synthesize only those that are relevant to problem.

3.7.1 Null Hypothesis H_0

There is no significant relationship between independent variables namely age, education, land holding, farming experience, family size, farm machinery, annual income, extension contact, occupation, innovativeness, social participation, mass media exposure, market orientation and economic orientation with extent of knowledge and adoption of recommended package of practices in turmeric crop .

3.7.2 Empirical Hypothesis H_1

There is a significant relationship between independent variables namely age, education, land holding, farming experience, family size, farm machinery, annual income, extension contact, occupation, innovativeness, social participation, mass media exposure, market orientation and economic orientation with extent of knowledge and adoption of recommended package of practices in turmeric crop .

Fresh turmeric rhizomes kept for boiling

Drying of boiled turmeric rhizomes

Researcher collecting data from the farmer

Turmeric rhizome boiler

Chapter IV

RESULTS AND DISCUSSION

Keeping in view the specific objectives, the empirical evidences obtained in terms of factual data through objective research procedures and design developed for the study, data has been analyzed by subjecting them to appropriate statistical and mathematical tests, the findings of the present investigation on **"A Study on the Knowledge and Adoption of turmeric farmers in Guntur district of Andhra Pradesh"** were presented under the following heads.

4.1 Personal, socio-economic and psychological characteristics of the turmeric farmers

4.2 Extent of knowledge of turmeric farmers on selected production technology

4.3 Extent of adoption of turmeric farmers on selected production technology

4.4 Relationship of the Personal, socio-economic and psychological characteristics features of turmeric farmers with their extent of knowledge and adoption.

4.5 Constraints of turmeric farmers in turmeric cultivation and suggestions zelicited from them to arrive at the strategy for increasing the production.

4.6 Presentation of a few typical caselets of turmeric farmers

4.7 Empirical model of the study

4.1. PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF THE TURMERIC FARMERS

Distribution of the respondents into different categories based on their selected profile characteristics was presented in the tables and interpreted through frequencies and percentages.

Table 4.1. Personal, socio-economic and psychological characteristics of the turmeric farmers at a glance

(n=120)

S.No.	Independent variables	Category	Respondents	
			F	P
1.	Age	Young age (< 35years)	23	19.17
		Middle age (36 to 58years)	69	57.50
		Old age (>58 years)	28	23.33
2.	Education	Illiterate	15	12.50
		Primary school	16	13.33
		Middle school	42	35.00
		High school	19	15.83
		Intermediate Education	24	20.00
		Graduation and above	4	3.33
3.	Land Holding	Marginal (0.1-1.0 ha)	22	13.33
		Small (1.1-2.0 ha)	31	18.33
		Semi-medium (2.1-4.0 ha)	38	25.83
		Medium (4.1-10.0 ha)	13	31.67
		Large (>10 acres)	16	10.83
4.	Farming Experience $\overline{X}$ = 2.11 σ = 0.723	Low (<1.39)	25	20.83
		Medium (1.40 to 2.84)	56	46.67
		High (>2.84)	39	32.50
5.	Family size $\overline{X}$ = 2.083 σ = 0.616	Small (<1.46)	29	24.16
		Medium (1.47 to 2.69)	74	61.67
		Big (>2.69)	17	14.17
6.	Farm machinery status	Low (6-11)	59	49.16
		Medium (11-16)	51	42.50
		High (16-21)	10	8.34
7.	Annual income	Low (<1.65)	25	20.83
		Medium (1.66 to 4.82)	63	52.50
		High (>4.82)	32	26.67

8.	Extension contact $\overline{X}$ = 18.258 σ = 5.082	Low (<13.17) Medium(13.18 to 23.34) High (>23.34)	23 70 27	19.17 58.33 22.50
9.	Occupation	Agriculture Agriculture + animal husbandry Agriculture +Labour Agriculture + Employee Agriculture + Business	76 29 8 3 4	63.30 24.80 6.00 2.50 3.40
10.	Innovativeness $\overline{X}$ = 14.75 σ = 4.295	Low (<10.45) Medium (10.46 to 19.04) High (>19.04)	23 71 26	19.17 59.16 21.67
11.	Social participation $\overline{X}$ = 9.583 σ = 2.186	Low (<7.39) Medium (7.40 to 11.77) High (>11.77)	24 69 27	20.00 57.50 22.50
12.	Mass media exposure $\overline{X}$ = 17.916 σ = 3.22	Low (<14.68) Medium(14.69 to 21.14) High (>21.14)	23 77 20	19.17 64.16 16.67
13.	Market orientation $\overline{X}$ = 11.275 σ = 2.725	Low (<8.54) Medium (8.55 to 14.00) High (>14.00)	31 66 23	25.83 55.00 19.17
14.	Economic orientation $\overline{X}$ = 16.866 σ = 5.365	Low (<11.50) Medium (11.51 to 22.23) High (>22.23)	28 72 20	23.33 60.00 16.67

A bird eye view of the Table 4.1 depicted that distribution of the turmeric farmers in accordance with selected Personal, socio-economic and psychological characteristics viz., age, education, land holding, farming experience, family size, farm machinery status, annual income, extension contact, occupation, innovativeness, social participation, mass media exposure, market orientation and economic orientation. Over view of the table indicated that turmeric farmers fall in medium category with respect to their Personal, socio-economic and psychological characteristics except for the farm machinery status.

4.1.1 Age

Table 4.2.Distribution of turmeric farmers according to their age

(n=120)

S.No	Category	Turmeric farmers	
		Frequency	Percentage
1.	Young age (< 35 years)	23	19.17
2.	Middle age (36-58 years)	69	57.50
3.	Old age (>58years)	28	23.33
	Total	120	100.00

It could be inferred from the Table 4.2 and Fig. 4.1 that 57.50 per cent of turmeric farmers belonged to middle age, followed by the rest belonging to old age (23.33%) and young age (19.17%).

From the above findings, it could be understood that majority of the respondents were found to be in middle and old age categories. The possible reason might be that a larger portion of the younger generation didn't prefer agriculture and also turmeric cultivation needs experience.

The above findings were in line with the findings of Natarajan (2004), Tidke *et al*. (2012), and Ganesh Kumar *et al*. (2013).

4.1.2 Education

Table 4.3.Distribution of turmeric farmers according to their education

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Illiterate	15	12.50
2.	Primary school	16	13.33
3.	Middle school	42	35.00
4.	High school	19	15.83

5.	Intermediate Education	24	20.00
6.	Graduation and above	4	3.33
	Total	120	100.00

A cursory look at Table 4.3 and Fig. 4.2 revealed that 35.00 per cent of the turmeric farmers had middle school education, followed by the rest belonging to Intermediate Education (20.00%), high school (15.83%), primary school (13.33%), illiterate (12.50%) and graduation and above (3.33%) categories.

Findings revealed that greater proportion of farmers were educated up to middle school and did not go for further studies, the probable reason might be their low annual income, lack of awareness on the importance of education and lack of encouragement from family members for continuing further studies.This finding was in conformity with the findings of Tidke *et al*. (2012).

4.1.3 Land Holding

Table 4.4.Distribution of turmeric farmers according to their land holding

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1	Marginal (0.1-1.0 ha)	22	18.33
2	Small (1.1-2.0 ha)	31	25.83
3	Semi-medium (2.1-4.0 ha)	38	31.67
4	Medium (4.1-10.0 aha)	13	10.83
5	large (>10 ha)	16	13.33
	Total	120	100.00

It could be comprehended from Table 4.4 and Fig. 4.3 that nearly half of the turmeric farmers had semi-medium land holdings (31.67%), followed by small (25.83) category. Whereas, 18.33 per cent belongs to marginal land

holding, 13.33 per cent belongs to large land holding and 10.83 per cent of them had medium land holding. Majority of the turmeric farmers were having semi-medium holdings followed by small holdings. The possible reason might be that in recent times most of the families were of nuclear system and joint family system is gradually fading away. This resulted in fragmentation of land among the family members.

The above findings were in line with the findings of Man and Sadiya (2009) and Praveenbabu *et al* (2016).

4.1.4 Farming Experience

Table 4.5. Distribution of turmeric farmers according to their farming experience

(N=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (< 2.56)	25	20.83
2.	Medium (2.57 to 5.24)	56	46.67
3.	High (> 5.24)	39	32.50
	Total	120	100.00

Mean=2.11 S.D. =0.72

The above Table 4.5 and Fig. 4.4 illustrated that nearly half of (46.67%) of the turmeric farmers had medium level of farming experience, followed by the rest with high (32.50%) and low (20.83%) level of farming experience. This might be due to the fact that majority of the respondents belonged to middle and old age categories. Hence most of the respondents were falling under medium to high category. Therefore, their experience can be exploited for better adoption of recommended technology to increase Turmeric production. This finding was in line with the findings of Kalyan (2011) and Arathy (2011) and Kumar *et al* (2013)..

4.1.5 Family Size

Table 4.6 Distribution of turmeric farmers according to their family size

(n=120)

S. No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Small (1-3 members)	29	24.16
2.	Medium (4-6 members)	74	61.67
3.	large (7-9 members)	17	14.17
	Total	120	100.00

An over view of the Table 4.6 and Fig. 4.5 indicated that majority of the turmeric farmers (61.67%) had medium family size, followed by the rest with small (24.16%) and large (14.17%) family size. The probable reasons behind these findings could be that the young and middle age people preferred to live in nuclear families while the old age people preferred joint families. Further awareness and formal education of respondents might have helped them to maintain small family size. The finding was in line with the studies of Meena *et al* (2009a) and Kiranmayi (2013).

4.1.6 Farm Machinery Status.

Table 4.7 Distribution of turmeric farmers according to their farm machinery status.

(n=120)

S.No.	Category	Respondents	
		Frequency	Percentage (%)
1.	Low (6-11)	59	49.16
2.	Medium (12-16)	51	42.50
3.	High (17-21)	10	8.34
	Total	120	100.00

It could be comprehended from the table 4.7 and fig 4.6 that nearly half of (49.16%) of farmers had low farm machinery status followed by medium (42.5%) high (8.34%) farm machinery status of the turmeric farmers. The possible reason for low farm machinery status could be low annual income and small land holding. These findings were in line with the findings of Archana (2012).

4.1.7 Annual Income

Table 4.8. Distribution of turmeric farmers according to their annual income

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (< 1.65)	25	20.83
2.	Medium (1.66 to 4.82)	63	52.50
3.	High (> 4.82)	32	26.67
	Total	120	100.00

Mean=3.24 S.D.=1.58

An over view of the Table 4.8 and Fig. 4.7 indicated that more than half of the turmeric farmers (52.50%) had medium level of annual income, followed by the rest with high (26.67%) and low (20.83) levels of annual income.

This might be due to the better returns from turmeric crop as it was good remunerative crop. But, more than one-fourth had high annual income may be due to their high land holding with additional sources of income as dairy, job or business.

These findings were in line with the findings of Mate (2006), Tidke *et al*. (2012) and Nrusimha Kalyan *et al*. (2012).

4.1.8 Extension Contact

Table 4.9. Distribution of turmeric farmers according to their extension contact

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (< 13.17)	23	19.17
2.	Medium (13.18 to 23.34)	70	58.33
3.	High (> 23.34)	27	22.50
	Total	120	100.00

Mean=18.25 S.D.=5.08

An overview of the Table 4.9 and Fig. 4.8 indicated that more than half (58.33%) of the turmeric farmers had medium extension contact, followed by those with high (22.50%) extension contact. Whereas, only 19.17 per cent of the turmeric farmers had low extension contact. The probable reasons attributed were that lack of field visits by extension personnel, inadequate extension staff in horticulture department, apathetic attitude of horticulture officers, lack of interest among the farmers.

The above findings are in line with the findings of Ramya (2005) and Ramalakshmi Devi *et al*. (2013).

4.1.9 Occupation

Table 4.10 Distribution of respondents according to their Occupation.

(n=120)

S.No.	Categorisation	Score	Percentage
1	Agriculture	76	63.30
2	Agriculture + Animal husbandry	29	24.80
3	Agriculture + labour	8	6.00
4	Agriculture + employment	3	2.50
5	Agriculture + Business	4	3.40
	Total	120	100.00

An overview of the Table 4.10 and Fig. 4.9 indicated that more than sixty per cent (63.30%) of the turmeric farmers had single profession of agriculture, followed by those with (24.80%) agriculture and animal husbandry, 6.00 per cent of the turmeric farmers had agriculture and labour as profession, 3.40% of turmeric farmers had agriculture and business and 2.50 % of turmeric farmers had agriculture and employment as profession. This finding was in conformity with the findings of Tidke *et al*. (2012).

4.1.10 Innovativeness

Table 4.11. Distribution of turmeric farmers according to their innovativeness

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (< 10.45)	23	19.17
2.	Medium (10.46 to 19.04)	71	59.16
3.	High (>19.04)	26	21.67
	Total	120	100.00

Mean=14.75 S.D.=4.28

The results from Table 4.11 and Fig. 4.10 indicated that more than half (59.17 %) of the turmeric farmers had medium level of innovativeness, followed by rest with high (21.67%) and low (19.17%) level of innovativeness. The possible reasons might be majority of the turmeric farmers being middle to old age with low and medium school education, small to marginal land holdings, medium social participation, medium mass media exposure.

This finding was in concurrence with the findings of Nrusimha Kalyan *et al*. (2012) and Ramalakshmi Devi *et al*. (2013).

4.1.11 Social Participation

Table 4.12. Distribution of turmeric farmers according to their social participation

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (< 7.39)	24	20.00
2.	Medium (7.40 to 11.77)	69	57.50
3.	High (> 11.77)	27	22.50
	Total	120	100.00

Mean=9.58 S.D.=2.18

It could be observed from the Table 4.12 and Fig. 4.11 that a majority (57.50%) of the turmeric farmers had medium level of social participation, followed by 22.50 per cent of them with high level and 20.00 per cent of them with low level of social participation. Some of the turmeric farmers were the members of agricultural cooperative societies and gram panchayats. For low social participation, the reason might be illiteracy which making them to take no interest in the activities of the organization. Hence, efforts needed to strengthen social and voluntary institutions to seek turmeric farmers participation with improved educational facilities.

The above findings were in agreement with the findings of Arathy (2011) and Ramalakshmi Devi *et al*. (2013).

4.1.12 Mass Media Exposure

Table 4.13. Distribution of turmeric farmers according to their mass media exposure

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (< 14.68)	23	19.17
2.	Medium (14.69 to 21.14)	77	64.16
3.	High (> 21.14)	20	16.67
	Total	120	100.00

Mean=17.91 S.D.=3.22

Results furnished in Table 4.13 and Fig. 4.12 indicated that majority (64.17%) of the turmeric farmers had medium mass media exposure, followed by 19.17 per cent with high and 16.67 per cent with low mass media exposure. The possible reason due to low educational levels, lack of awareness of farmers regarding the broadcasting timings, non-availability of farm magazines like Annadatha, Vyvasaya panchangam in remote areas, lack of interest to know new technologies, financial problems and busy with other activities and programmes.

These results were in line with the findings of Ramya (2005), Balu Naik and Ramesh babu (2010) and Nrusimha Kalyan *et al*. (2012).

4.1.13 Market Orientation

Table 4.14. Distribution of turmeric farmers according to their market orientation

(n=120)

S.No.	Category	Turmeric Farmers	
		Frequency	Percentage
1.	Low (<8.55)	31	25.83
2.	Medium (8.56 to 14.00)	66	55.00
3.	High (>14.00)	23	19.17
	Total	120	100.00

Mean=11.27 S.D.=2.72

The findings that embellished in Table 4.14 and Fig. 4.13 revealed that 55.00 per cent of the turmeric farmers had medium market orientation, followed by remaining with low (25.83%) and high (19.17%) levels of market orientation. The plausible reason for this trend might be that majority of turmeric farmers have an habitual nature to sell their produce to middle men after processing the turmeric to meet their day to day expenses and for repaying their debts.

Similar findings were reported by Palaniswamy and srinivas (2001), Yogitha (2004) and Gowda *et al*. (2011).

4.1.14 Economic Orientation

Table 4.15.Distribution of turmeric farmers according to their economic orientation

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (< 11.50)	28	23.33
2.	Medium (11.51 to 22.23)	72	60.00
3.	High (>22.23)	20	16.67
	Total	120	100.00

Mean=16.86 S.D.=5.36

It could be inferred from Table 4.15 and Fig. 4.14 that more than half (60.00%) of the turmeric farmers had medium economic orientation, followed by low (23.33%) and high (16.00%) levels of economic orientation. Overall, 80.00 per cent of them had low to medium economic orientation.

This trend might be due to the majority of the turmeric farmers belonging to middle to old age, middle school, semi-medium to small land holding, low to medium annual income, medium social participation. These findings were in line with the findings of Palaniswamy and Srinivas (2001), Gopinath (2005) and Gowda *et al*. (2011).

4.2 LEVEL OF KNOWLEDGE OF TURMERIC FARMERS ON SELECTED PRODUCTION TECHNOLOGY

Table 4.16.Distribution of turmeric farmers according to their level of knowledge

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (< 43.41)	22	18.33
2.	Medium (43.42 to 60.62)	71	59.17
3.	High (> 60.62)	27	22.50
	Total	120	100.00

Mean=52.01 S.D.=8.60

A glance at the Table 4.16 and Fig. 4.15 showed that majority (59.17) of the turmeric farmers had medium level of knowledge, followed by the rest with high (22.50%) and low (18.33%) levels of knowledge.

The reason for this trend could be the medium economic orientation, market orientation, medium mass media exposure and extension contact.

Hence, the Extension personnel of department of Horticulture and department of Agriculture and KVK's should make efforts to conduct training programmes on turmeric cultivation, conduct demonstrations, field visits by HO, inspiring them to have more extension contact, social participation, mass media exposure and conduct study tours to observe the profitable cultivation of turmeric cultivation in other states and districts so that they can have high extent of knowledge on selected turmeric production technology.

Similar findings were reported by Verma *et al*. (2003), Patel *et al*. (2011) Ambedkar *et al*. (2013), Surat Singh and Sarju (2014).

Table 4.17. Content analysis of level of knowledge on selected production technology of turmeric farmers

(n=120)

S. No.	Particulars*	Knowledge				Rank
		Correct		Incorrect		
		F	%	F	%	
1	The turmeric varieties Duggirala, salem and tekurpet mature by nine months	109	90.83	11	9.17	3
2	Long duration varieties of turmeric mature by nine months	112	93.33	8	6.67	1
3	For export of the turmeric the Curcumin content should be 4.0	14	08.33	106	91.67	33
4	Best time for sowing of long duration varieties is June	63	52.50	57	47.50	15
5	In last ploughing 10 tons of FYM was added.	55	45.83	65	54.17	23
6	Seed rhizomes were soaked in Ridomil @ 3 gms/lit, before sowing for time period of 30 minutes.	74	61.67	46	38.33	8

7	The optimum seed rate recommended for seed rhizomes for one acre was 1000 kgs.	81	67.50	39	32.50	6
8	The optimum spacing maintained in ridges and furrows method is 45×20 cm.	68	56.67	52	43.33	12
9	Rhizome fly infestation will cause Dead heart	37	30.83	83	69.17	29
10	The total germination process in Turmeric completes by 40 DAS	66	55.00	54	45.00	13
11	The dosage of pendimethalin which has to be sprayed for control of weeds/ acre	57	47.50	63	52.50	21
12	The recommended dosage of Urea fertilizer dosage for turmeric was 150 kgs / acre	47	39.17	73	60.83	25
13	The recommended dosage of SSP fertilizer in turmeric was 150 kgs / acre	42	35.00	78	65.00	27
14	The recommended dosage of MOP fertilizer in turmeric is 50 kgs / acre	52	43.33	68	56.67	24
15	Collar region of the pseudostem becomes soft resulting in collapse of the plant and decay of rhizomes was the symptom of rhizome rot	61	50.83	59	49.17	17
16	Within seven days the harvested rhizomes should be boiled.	80	66.67	40	33.33	7
17	Fumes with typical odour was the characteristic symptom of completely boiled rhizomes	110	91.67	10	8.33	2
18	Afflotoxin attack was seen when boiled rhizomes are not properly dried.	46	38.33	74	61.67	26
19	During last stage of polishing water solution Prepared with turmeric powder is sprayed over rhizomes	16	13.33	104	86.67	33
20	The optimum time period required for complete boiling of rhizomes is 30 minutes.	63	52.50	57	47.50	15
21	Nitrogen fertilizers should be applied at the time of sowing, 40, 80 and 120 DAS	60	50.00	60	50.00	18

22	Turmeric leaf blotch can be controlled by spraying carbendizim @ 1gm /lit water	58	48.33	62	51.67	19
23	Decrease in yield was noticed when sowing is done after second fortnight of July.	95	79.17	25	20.83	5
24	If drip system was used for irrigation the laterals spaced at 1 meter distance and emitters at 60 cm distance.	33	27.50	87	72.50	30
25	Iron deficiency corrected by ferrous sulphate and citric acid @ 5 gm + 1 gm/ lit	74	61.67	46	38.33	8
26	When rhizome rot was observed in field, gap between two irrigations should be increased.	39	32.50	81	67.50	28
27	Brown spots of various sizes on the upper surface of the young leaves is a symptom of leaf spot	58	48.33	62	51.67	19
28	Zinc sulphate should be added to soil during land preparation.	27	22.50	93	77.50	31
29	Turmeric crop can be grown in heavy soils with 15-20 irrigations.	71	59.17	49	40.83	10
30	Main season of harvesting falls in march.	108	90.00	12	10.00	4
31	Placing of neem cake at collar region of plants can control the Rhizome fly and Rot.	25	20.83	95	79.17	32
32	Rhizome rot incidence was less when crop irrigated with drip system.	56	46.67	64	53.33	22
33	Rhizome fly can be controlled by application of carbofuran granules.	64	53.33	56	46.67	14
34	Crop rotation was compulsory practice in turmeric cultivation.	71	59.17	49	40.83	10

(*Multiple Response Format)

Results furnished in the table 4.17 revealed that 75 to 100 per cent of the farmers had knowledge about selected production technology of turmeric in the percentage rank order of their decreasing importance are : Long duration varieties of turmeric mature by 9 months (93.33%), fumes with typical odour was the characteristic symptom of completely boiled rhizomes gives (91.67%), The turmeric varieties Duggirala, salem and tekurpet mature by nine many months (90.83%), Main season of harvesting falls in march. (90.00%), and Decrease in yield was noticed when if sowing had done after second fortnight of July. (79.17%),

A glance at the table 4.17 revealed that knowledge was high with respect to simple agronomical practices like sowing, varieties and curing of rhizomes which involves experience.

It was also revealed that 50 to 75 per cent of the farmers had knowledge about selected production technology of turmeric in the percentage rank order of their decreasing importance are : the optimum seed rate recommended for seed rhizomes for one acre was 1000 kg per acre (67.50%), Within seven days the harvested rhizomes should be boiled (66.67%), Iron deficiency can be corrected by spraying ferrous sulphate and citric acid @ 5 gm + 1 gm/ lit (61.67%), Seed rhizomes are soaked in Ridomil @ 3 gms/lit, for the time period of 30 minutes (61.67%), Turmeric crop can be grown in heavy soils with 15-20 irrigations (59.17%), Crop rotation was compulsory practice in turmeric cultivation (59.17%), The optimum spacing turmeric of in ridges and furrows method is 45 × 20 (56.67%), The total germination process in Turmeric completes by 40 days (55.00%), Rhizome fly can be controlled by application of carbofuran granules (53.33%) and The optimum time period required for complete boiling of rhizomes is 30 minutes (52.50%). Best time for sowing of long duration varieties was first fortnight of June i (52.50%), Collar region of the pseudostem becomes soft resulting in collapse of the plant and decay of rhizomes was the symptom of rhizome rot (50.83%), Nitrogen fertilizerts should applied at the time of sowing, 40, 80 and 120 DAS (50.00%).

An over view of the table 4.17 implies that majority of the Turmeric farmers had medium knowledge with respect to seed rate, seed treatment, nutrient management and water management aspects which involves technical skills and expertise and require comprehensive knowledge on the operational aspects.

It is also revealed that 25 to 50 per cent of the farmers had knowledge about selected production technology of turmeric in the percentage rank order of their decreasing importance are: Turmeric leaf blotch can be controlled by spraying carbendizim @ 1ml /lit (48.33%), Brown spots of various sizes on the

upper surface of the young leaves was a symptom of leaf spot (48.33%), The dosage of pendimethalin which has to be be sprayed for control of weeds/ acre is 1lit/acre (47.50%). Rhizome rot incidence was less when crop irrigated with drip system. (46.67%), In last ploughing the amount of FYM should be added was 10 tonnes (45.83%), The recommended dosage of MOP fertilizer in turmeric was 50 kg/acre(43.33%), The recommended dosage of Urea fertilizer is dosage for turmeric 150 kg/acre (39.17%), Afflotoxin attacks when boiled rhizomes are not properly boiled (38.33), The recommended dosage of SSP fertilizer in turmeric was 150 kg/acre (35.00%), When rhizome rot was observed in field, gap between two irrigations should be increase (32.50%) Rhizome fly infestation will cause dead heart, (30.83%). if drip system was used for irrigation the laterals spaced at 1 meter distance and emitters at 60 cm distance (27.50%), Zinc sulphate should be added to soil during land preparation, (22.50%), Placing of neem cake at collar region of plants can control the rhizome rot and Blotch (13.33%) and For export of the turmeric the curcumin content should be 4.5 (08.33%).

From the table 4.17 it is clear that less per cent of the turmeric farmers about pest management, methods of application of fertilizers and organic manures, drip system of irrigation, and micro nutrients application. The possible reason for this may be lack of exposure on new technologies like drip system.

The results regarding the level of knowledge of farmers on selected production technology of turmeric reveals the importance of organization of seasonal long training programmes, demonstrations, exposure visits, farmer-scientist interactions for further enhancement of knowledge of the respondents on good agricultural practices related to turmeric cultivation. So the Department of horticulture, Krishi Vigyan Kendras (KVK), District Agricultural Advisory and Transfer of Technology Centres (DAATTC) should organize the above extension activities for enhancement of knowledge of the farmers and thereby increasing the extent of knowledge of recommended turmeric production technology.

4.3 EXTENT OF ADOPTION OF TURMERIC FARMERS ON SELECTED PRODUCTION TECHNOLOGY

Table 4.18. Distribution of turmeric farmers according to their extent of adoption

(n=120)

S.No.	Category	Turmeric farmers	
		Frequency	Percentage
1.	Low (<56.28)	23	16.67
2.	Medium (56.29 to 69.02)	64	62.50
3.	High (> 69.02)	33	20.83
	Total	120	100.00

Mean= 72.55 S.D.= 15.05

An overview of Table 4.18 and Fig. 4.16 makes it clear that 62.50 per cent of turmeric farmers had medium extent of adoption, followed by high (20.83%) and low (16.67%) adoption levels with regard to adoption of turmeric production technology.

The plausible reasons for medium extent of adoption are medium innovativeness, risk orientation, economic orientation, market orientation, mass media exposure, extension contact and medium knowledge.

The reasons for low adoption are low level of annual income, low social participation, low extension contact and mass media exposure. Most of them were middle to old age, nearly 35.00 per cent of the turmeric farmers educated only up to middle school education.

Hence, the extension personnel of department of Horticulture and agriculture have to organize the training programmes about Turmeric cultivation to impart knowledge and provision of credit facilities, subsidy on Turmeric cultivation, provision of support price which will enhance the adoption level of turmeric farmers.

The above findings were in conformity with the findings of Rath *et al.* (2007) Ganeshprasad *et al*. (2010) and Matouleibi Chanu *et al*. (2014).

Table 4.19. Content analysis of extent of adoption of selected production technology of turmeric farmers

(n=120)

S. No.	Recommended practice*	Extent of Adoption					
		FA		PA		NA	
		F	%	F	%	F	%
1.	Growing of turmeric in heavy soil.	120	100.00	0	0.00	0	0
2.	Deep summer ploughing for 6-8 times.	41	34.17	71	59.17	8	6.67
3.	Seed rate : 1000 kg/acre	120	100.00	0	0.00	0	0.00
4.	Seed treatment : Ridomil @ 3g/lit water	17	14.17	60	50.00	43	35.83
5.	Sowing the turmeric rhizome before second fortnight of july	106	88.33	14	11.67	0	0.00
6.	Method of sowing: Ridge and furrow	84	70.00	0	0.00	36	30.00
7.	Depth of sowing: 5-7 cm	77	64.17	43	35.83	0	0.00
8.	Sowing recommended varieties like duggirala, tekurpet amd selam	103	85.83	17	14.17	0	0.00
9.	Adding recommended fertilizers in the last plough FYM, Castor/Neem cake, $ZnSo_{4,}$SSP, MOP	34	28.33	65	54.17	21	17.50
10.	At the time of sowing Neem cake @200kg /acre.	38	31.67	58	48.33	24	20.00
11.	At 120 DAS: urea @50 kg /acre and MOP @ 25 kg / acre	51	42.50	50	41.67	19	15.83
12.	Weed free conditions should be maintained up to 120 DAS.	105	87.50	0	0.00	15	12.50
13.	Spraying of Pendimethalin @ 1 lit in 200 litres of water next day after sowing.	27	22.50	24	20.00	69	57.50
14.	Giving irrigation immediately after planting	97	80.83	23	19.17	0	0.00
15.	In heavy soils 15-20 irrigation were given	36	30.00	75	62.50	9	7.50
16.	Drip system is followed in irrigation	28	23.33	0	0.00	92	76.67
17.	Seed treatment with malathoin @ 5ml/lit for 30 mins for control of Rhizome scales.	41	34.17	43	35.83	36	30.00

18.	Seed treatment with profenophos @2ml/lit and Carbofuran granules @ 10 kg/acre for control of Rhizome fly	45	37.50	46	38.33	29	24.17
19.	Cultivating rhizome fly restitant varieties live suguna and sudarshna.	57	47.50	0	0.00	63	52.50
20.	Soil drenching with Ridomil MZ @ 2.5 g/lit to minimize the incidence of Rhizome rot	63	52.50	33	27.50	24	20.00
21.	Spraying Carbendazim @ 1 g/l to control Turmeric leaf blotch:	62	51.67	42	35.00	16	13.33
22.	Spray Carbendazim@1 g/l + Propiconazole @1 ml/l two times in 15 days gap to control turmeric leaf spot	67	55.83	44	36.67	9	7.50
23.	Harvesting stage: all leaves turns dry and falls on soil	120	100.00	0	0.00	0	0.00
24.	Harvesting the rhizomes with the help of the harvesters	12	10.00	0	0.00	108	90.00
25.	Boiling of harvested rhizomes within 2-7 days	64	53.33	20	16.67	36	30.00
26	Boiling the mother and finger rhizomes seperately.	112	93.33	0	0.00	8	6.67
27	Boiling was stopped when forth comes out and white fumes appear	116	96.67	4	4	3.33	0
28.	Rhizomes should be boiled for time period of 45-60 minutes	78	65.00	42	35.00	0	0.00
29.	Use of steam boilers for boiling of turmeric produce	4	3.33	0	0.00	116	96.67
30	Boiled rhizomes were dried for 10-15 days	109	90.83	11	9.17	0	0.00
31.	Dried rhizomes were polished to improve appearance.	58	48.33	31	25.83	31	25.83
32.	Rhizomes were graded according to the size	74	61.67	33	27.50	13	10.83
33.	Gunny bags used for storing rhizomes in godown are sprayed with Malathion @ 10 ml/l	8	6.67	23	19.17	89	74.17
34.	Rhizomes for seed material should not store under direct sun light	109	90.83	11	9.17	0	0.00

(*Multiple Response Format)

Note: FA = Fully Adopted, PA = Partially Adopted NA = Not Adopted

Results furnished in the table 4.19 revealed that fully adopted the selected production technology by turmeric farmers in percentage rank order of their decreasing importance are; adoption of recommended seed rate (100%), Growing of turmeric in heavy soil. (100%), Harvesting stage: all leaves turns dry and falls on soil (100%), Boiling was stopped when forth comes out and white fumes appear (96.67%), Boiling the mother and finger rhizomes seperately. (93.33%), Boiled rhizomes were dried for 10-15 days (90.83%), Sowing the turmeric rhizome before second fortnight of July (88.33), Weed free conditions should be maintained up to 120 DAS (87.50), Rhizomes for seed material should not store under direct sun light (86.67%), Sowing recommended varieties like duggirala, tekurpet amd selam (85.83%), Giving irrigation immediately after planting (80.83%), Method of sowing: Ridge and furrow (70.00%), Rhizomes should be boiled for time period of 45-60 minutes (65.00%), Depth of sowing: 5-7 cm (64.17%). Rhizomes were graded according to the size (61.67%), Spray Carbendazim@1 g/l + Propiconazole @1 ml/l two times in 15 days gap to control turmeric leaf spot (55.83%), Boiling of harvested rhizomes within 2-7 days (53.33%), Soil drenching with Ridomil MZ @2.5 g/lit to minimize the incidence of Rhizome rot (52.50%), Spraying Carbendazim @ 1 g/l to control Turmeric leaf blotch (51.67), Dried rhizomes are polished to improve appearance, (48.33), At the time of sowing Neem cake @200kg /acre. (31.67), Drip system was used for irrigation(23.33), Gunny bags used for storing rhizomes in godown are sprayed with Malathion @ 10 ml/l(6.67).

It also revealed the partially adopted the selected production technology by turmeric farmers in the percentage rank order of their decreasing importance were; In heavy soils 15-20 irrigation were given (62.50%), Deep summer ploughing for 6-8 times. (59.17%), application of Neem cake @200kg /acre at the time of sowing. (48.33%), Seed treatment with profenophos @2ml/lit and Carbofuran granules @ 10 kg/acre for control of Rhizome fly (38.33%), Seed treatment with malathoin @ 5ml/lit for 30 mins for control of Rhizome scales. (35.83%), Spraying Carbendazim @ 1 g/l to control Turmeric leaf blotch (35.00%), Soil drenching with Ridomil MZ @2.5 g/lit to minimize the incidence of Rhizome rot (27.50%), Dried rhizomes were polished to improve appearance. (25.83%), Spraying of Pendimethalin @ 1 lit in 200 litres of water next day after sowing. (20.00%), Giving irrigation immediately after planting (19.17%),

Gunny bags used for storing rhizomes in godown were sprayed with Malathion @ 10 ml/l (19.17%), Boiling of harvested rhizomes within 2-7 days. (16.67%), Sowing recommended varieties like duggirala, tekurpet amd selam (14.17%), Sowing the turmeric rhizome before second fortnight of july (11.67%), Boiled rhizomes was dried for 10-15 days (09.17%) and Boiling was stopped when forth comes out and white fumes appear (3.33)

It, further, revealed that selected production technology which is not adopted by the turmeric farmers in the percentage order of their decreasing importance are; Use of steam boilers for boiling of turmeric produce (96.67%), Harvesting the rhizomes with the help of the harvesters (90.00%), Drip system was followed in irrigation (76.67%), Gunny bags used for storing rhizomes in godown are sprayed with Malathion @ 10 ml/l (74.17%), Spraying of Pendimethalin @ 1 lit in 200 litres of water next day after sowing. (57.50%), Cultivating rhizome fly restitant varieties like suguna and sudarshna. (52.50%), Seed treatment : Ridomil @ 3g/lit water (35.83%), Method of sowing: Ridge and furrow (30.00%), Dried rhizomes were polished to improve appearance.(25.83%), Soil drenching with Ridomil MZ @2.5 g/lit to minimize the incidence of Rhizome rot (20.00%), Adding recommended fertilizers in the last plough FYM, Castor/Neem cake, $ZnSo_{4,}$SSP, MOP (17.50%) and Rhizomes are graded according to the size (10.83%)

The reasons for medium adoption might be due to medium knowledge, lack of awareness, lack of interest in knowing recommended package of practices of sugarcane, non-availability of materials in time, non-availability of labour at planting time, High cost of fertilizers, Lack of knowledge on dosage of different pesticides and fungicides, High cost of machinery for small and marginal farmers, Lack of remunerative price and Delayed cash payment in sugar factories. Hence, authorities should orient their attention in imparting more training to farmers, and arranging field trips to demonstration plots, inculcate the urge to achieve more and more yield from the field and raise their economic conditions to increase the extent of adoption of recommended practices to a high level from the present medium level.

4.4 RELATIONSHIP OF PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF TURMERIC FARMERS WITH THEIR LEVEL OF KNOWLEDGE AND EXTENT OF ADOPTION

4.4.1 Relationship of Personal, Socio-economic and Psychological Characteristics of Turmeric Farmers with their extent of Knowledge

An attempt has been made to find out if there exists any relationship of the Personal, socio-economic and psychological characteristics of turmeric farmers viz., age, education, land holding, family size, farm machinery status, annual income, extension contact, occupation, innovativeness, social participation, mass media exposure, market orientation, economic orientation, with their extent of knowledge of selected production technology.

Table 4.20. Correlation coefficient of Personal, Socio-economic and Psychological Characteristics of the Turmeric farmers with their level of knowledge

(n =120)

S.No.	Personal, Socio-economic and Psychological Characteristics	'r' value
1.	Age	0.454**
2.	Education	0.648**
3.	Land holding	0.068NS
4.	Farming Experience	0.377**
5.	Family size	0.076NS
6.	Farm machinery status	0.164NS
7.	Annual income	0.152NS
8.	Extension contact	0.749**
9.	Occupation	-0.035NS
10.	Innovativeness	0.819**
11.	Social participation	0.214**
12.	Mass media exposure	0.494**
13.	Market orientation	0.058NS
14.	Economic orientation	0.664**

NS = Non significant ** Significant at 0.01 level of probability

It was evident from the Table 4.20 that computed ‘r’ values of age, education, farming experience, extension contact, innovativeness, social participation, mass media exposure and economic orientation were significant at 0.01 level of probability. The other variables such as land holding, family size, farm machinery status, annual income, occupation and market orientation did not show any significant relationship with level of knowledge on selected turmeric production technology.

Null Hypothesis

There was no significant relationship of the selected Personal, Socio-economic and Psychological Characteristics of the turmeric farmers with their level of knowledge on selected production technology.

Empirical Hypothesis

There will be a significant relationship of the selected Socio-economic and Psychological Characteristics of the turmeric farmers with their level of knowledge on selected production technology.

4.4.1.1 Age Vs level of knowledge

From Table 4.20 it was evident that there was positive and significant relationship between age and level of knowledge of turmeric farmers with the computed r-value (0.454**). From this, it could be inferred that as the age increases, knowledge also increases significantly. This might be due to the experience gained by the middle and old age farmers over the years, at the same time they could acquire significant knowledge due to their middle level of education.

The above findings were in line with the findings of Mukesh *et al.* (2015) and Praveenbabu *et al*. (2015).

4.4.1.2 Education Vs extent of knowledge

It was evident from the Table 4.20 that there was a positive and significant relationship between education and extent of knowledge of turmeric farmers with the computed r-value (0.648**). It facilitates them to have better access to farm information sources such as farm magazines, farm bulletins, books on agriculture *etc*. and possess better capacity to grasp things and analyze and interpret them in proper ways. Further, educated people have more exposure to extension agencies, scientists, and research stations, which also contribute to their increased knowledge.

This finding were in conformity with the findings of Mukesh *et al.* (2015) and Praveenbabu *et al*. (2015).

4.4.1.3 Land holding Vs extent of knowledge

It was evident from the Table 4.20 that there was positive and non-significant relationship between land holding and extent of knowledge of turmeric farmers with the computed r-value (0.068NS). This might be due to the fact that the knowledge is the cognitive character, which had not affected by the farm holding. Further, majority of Turmeric farmers were leasing their lands instead of cultivating themselves.

Similar findings were reported by Prasad Reddy *et al.* (2017) and Sravan Kumar *et al*. (2012).

4.4.1.4 Farming experience Vs extent of knowledge

The results in Table 4.20 presented that the computed r-value (0.377**) for extent of knowledge of recommended package of practices for turmeric farmers. Turmeric farmers showed positive significant relationship with their extent of knowledge on recommended package of practices. It was obvious that experienced farmers will have more knowledge because of continuous cultivation, trainings, extension contact etc.

The finding was in accordance with the study of Ambedkar (2010) and Praveenbabu *et al*. (2015).

4.4.1.5 Family size Vs extent of knowledge

The results in Table 4.20 revealed that the computed r-value (0.045NS) for family size and extent of knowledge of recommended package of practices for turmeric farmers. Turmeric farmers family size showed positive and non-significant relationship with their extent of knowledge. This indicated that family size did not significantly influence the extent of knowledge of recommended package of practices.

These finding were in line with the study of Prakash and De (2008) and Meena *et al.* (2009a).

4.4.1.6 Farm machinery status Vs extent of knowledge

The results in Table 4.20 revealed that the computed r-value (0.164NS) for farm machinery and extent of knowledge on recommended package of practices for turmeric farmers. Turmeric farmers farm machinery status showed positive and non-significant relationship with extent of knowledge of recommended package of practices. The probable reason might be that majority of turmeric farmers having medium to high annual income, extension contact, mass media exposure and middle school education. The finding was in line with the study of Singh (1987).

4.4.1.7 Annual income Vs extent of knowledge

It is clear from Table 4.20 that the annual income of the turmeric farmers showed positive and non- significant relationship with their extent of knowledge with the computed r- value of (0.521NS). The possible reason could be income from other occupations like diary, poultry *etc*. The above finding were in line with the findings of Shubhadeep Roy *et al*. (2007).

4.4.1.8 Extension Contact Vs extent of knowledge

The data presented Table 4.20 clearly indicated that there was positive and significant with the computed value (0.749**) relationship between extension contact of turmeric farmers and their extent of knowledge. This clearly implies that the extent of knowledge increases with the increase in extension contact. Extension agencies were considered as best and reliable source of information for the farmers. Extension contact enables the farmer to different kinds of information, in turn enlarge their sphere of knowledge about recent production technology of turmeric. Hence, the above relationship was noticed. This calls for extended efforts of extension agencies.

Similar findings were reported by Gopinath (2005) and Ambedkar (2010) and Praveenbabu *et al*. (2015).

4.4.1.9 Occupation Vs extent of knowledge

It is clear from Table 4.20 that the occupation of the turmeric farmers showed negative and non- significant relationship with their extent of knowledge with the computed r- value of (-0.035NS). The reason might be with the increase of the level of the occupation the farmer will have less exposure to the production technology of the turmeric. The above finding was in line with the findings of Sukanta *et al*. (2013).

4.4.1.10 Innovativeness Vs extent of knowledge

It is clear from Table 4.20 that there was a positive and highly significant relationship between innovativeness and extent of knowledge with the computed r-value (0.819**) of turmeric farmers. This means that the higher innovativeness of the farmer, the more would be the extent of knowledge. This trend might be due to the fact that farmers with high innovativeness desire to look for changes in farming techniques and introduce changes in his own operations. This desire make them to acquire innovations directly from scientists in terms of knowledge about recommended practices.

The above findings were in line with the findings of Sravan kumar (2012) and Praveenbabu *et al*. (2015).

4.4.1.11 Social participation Vs extent of knowledge

The results in Table 4.20 highlighted that the computed r-value (0.214**) for social participation and extent of knowledge of recommended package of practices for turmeric farmers. This inferred that farmers who actively participate in social activities through social organizations come across different types of people, exchange one's views and experiences, discuss about problems and solutions and thereby gain more and more knowledge.

The finding was in line with the results of Prasad *et al* (2007), Shakya *et al.* (2008) and Ambedkar (2010)

4.4.1.12 Mass media exposure Vs extent of knowledge

The results presented in the Table 4.20 revealed the computed r-value (0.494**) for mass media exposure and extent of knowledge on recommended package of practices for turmeric farmers. Turmeric farmers mass media exposure showed highly positive significant relationship with their extent of knowledge of recommended package of practices. It can be inferred that as the mass media exposure on the part of farmers increases, their knowledge would also increase. Mass media is powerful source of spreading technologies. Thus, the mass media provides enormous opportunity for related exposure of farmers to new technologies, motivating them to learn about Turmeric cultivation practices.

The finding was in conformity with the findings of Ambedkar (2010) and Praveenbabu *et al*. (2015).

4.4.1.13 Market orientation Vs extent of knowledge

The results presented in the Table 4.20 showed that the computed r-value (0.058NS) for market orientation and extent of knowledge on recommended package of practices for turmeric farmers. Market orientation of turmeric

farmers showed positive and non-significant relationship with their extent of knowledge of recommended package of practices. Market intelligence and price forecast was not up to the mark as far as turmeric marketing concerned. Further, the farmers were mostly small farmers may not look about the marketing aspects and they sell their produce to the middle men without going to regulated market yard because of their debts.

The finding was in tune with the finding of Ambedkar (2010) and Praveenbabu *et al*. (2015).

4.4.1.14 Economic orientation Vs extent of knowledge

The results presented in the Table 4.20 exhibited that the computed r-value (0.668**) for economic orientation and extent of knowledge on recommended package of practices for turmeric farmers. Economic orientation of turmeric farmers showed highly positive significant relationship with their extent of knowledge of recommended package of practices. It could be inferred that, farmers who possessed more economic orientation had more knowledge. Economic orientation acts as an initiating factor for acquiring knowledge about improved technologies, Hence this type of trend was noticed.

The finding was in conformity with Sravan Kumar (2012) and Praveenbabu *et al*. (2015).

4.4.2 Multiple Linear Regression Analysis of Personal, Socio-economic and Psychological Characteristics of the Turmeric farmers with their Extent of Knowledge

An attempt has been made to find out the amount of contribution made by the Personal, Socio-economic and Psychological Characteristics in explaining the variation in the dependent variable i.e. knowledge towards Turmeric cultivation. The results were presented in Table 4.21.

Table 4.21. Multiple linear regression analysis of personal, socio-economic and psychological characteristics of the turmeric farmers with their extent of knowledge

(n =120)

S.No.	Personal, Socio-economic and Psychological Characteristics	Regression coefficient	Standard error	't' value
1.	Age	0.017	0.872	0.259
2.	Education	0.108	0.329	1.675
3.	Land holding	-0.013	0.410	-0.286
4.	Farming experience	0.109	0.746	1.736**
5.	Family size	-0.009	0.630	-0.201
6.	Farm machinery status	-0.015	0.131	-0.294
7.	Annual income	-0.021	0.266	-0.422
8.	Extension contact	0.254	0.108	3.992**
9.	Occupation	0.001	0.407	0.030
10.	Innovativeness	0.406	0.138	5.892**
11.	Social participation	0.158	0.177	1.294*
12.	Mass media exposure	0.069	0.136	1.353
13.	Market orientation	0.012	0.149	0.259
14.	Economic orientation	0.190	0.094	3.251**

a = 17.017 R^2 = 0.809

NS = Non-Significant ** Significant at 0.01 level of probability

From the above table the MLR equation can be fit as $Y = 17.017 + 0.259x_1 + 1.675x_2 + -0.286x_3 + 1.736**x_4 + -0.201x_5 + -0.294x_{6+} - 0.422x_7 + 3.992**x_8 + 0.030x_9 + 5.892**x_{10} + 1.294*x_{11} + 1.353x_{12} + 0.259x_{13} + 3.251**x_{14}$

Table 4.21 revealed that the coefficient of determination "$R^{2"}$ value was significant, as the value of "a" was found significant. The "$R^{2"}$ value of 0.809 indicated that all the selected 14 independent variables put together, explained about 80.90 per cent variation in the level of knowledge of turmeric farmers. Remaining 19.10 per cent was due to the extraneous effects of the variables. Hence, it could be stated that the variables selected to a large extent explained the variation in level of knowledge of the turmeric farmers.

The regression coefficient given in Table 4.21 further revealed that the Personal, Socio-economic and Psychological Characteristics namely farming experience, extension contact, innovativeness, social participation and economic orientation were found to be positively significant. Remaining variables viz., age, education, land holding, family size, farm machinery status, annual income, occupation, mass media exposure and market orientation were Non-significant in this analysis.

This implied that farming experience, extension contact, innovativeness, social participation and economic orientation were contributed significantly to the prediction of the variation in the level of knowledge of the turmeric farmers about the selected production technology.

4.4.3 Relationship of the Personal, Socio-economic and Psychological Characteristics of the Turmeric Farmers with their Extent of Adoption

An attempt has been made to find out if there exists any relationship of Personal, Socio-economic and Psychological Characteristics namely age, education, land holding, farming experience, family size, farm machinery status, annual income, extension contact, occupation, innovativeness, social participation, mass media exposure, market orientation and economic orientation with their extent of adoption of selected production technology.

Table 4.22. Correlation Coefficient of Personal, Socio-economic and Psychological Characteristics of the Turmeric Farmers with their Extent of Adoption

(n =120)

S.No.	Personal, Socio-economic and Psychological Characteristics	'r' value
1.	Age	0.432**
2.	Education	0.905**
3.	Land holding	-0.030NS
4.	Farming experience	0.344**
5.	Family size	0.128NS
6.	Farm machinery status	0.289**

7.	Annual income	0.338**
8.	Extension contact	0.570**
9.	Occupation	-0.063NS
10.	Innovativeness	0.676**
11.	Social participation	0.149NS
12.	Mass media exposure	0.502**
13.	Market orientation	0.037NS
14.	Economic orientation	0.563**

NS = Non-Significant ** Significant at 0.01 level of probability

From the Table 4.22 It could be observed that the computed 'r' values of age, education, farming experience, farm machinery status, annual income, extension contact, innovativeness, mass media exposure, economic orientation were found to be significant at 0.01 level of probability. Whereas, computed 'r' values of land holding, family size, occupation, social participation, market orientation with the extent of adoption of selected production technology were found to be non-significant.

Null Hypothesis

There is no significant relationship of the selected profile characteristics of turmeric farmers with their extent of adoption.

Empirical Hypothesis

There will be a significant relationship of the selected profile characteristics of turmeric farmers with their extent of adoption.

4.4.3.1 Age Vs extent of adoption

The results presented in Table 4.22 revealed that the computed r-value (0.432**) for age and extent of adoption of recommended package of practices of turmeric farmers. Turmeric farmers age showed positive significant relationship with extent of adoption of recommended package of practices. This indicated that as the age increases, the adoption of package of practices also increased. The probable reason might be that turmeric being commercial crop requires high experience and knowledge which increases with age of the farmer, so with the increase of age of turmeric farmers adoption level increases.

The above findings were in line with the findings of Singh *et al.* (2003), Sandeep *et al.* (2013), and Kiranmayi (2013).

4.4.3.2 Education Vs extent of adoption

The computed r-value (0.905**) for education and extent of adoption of recommended package of practices of turmeric farmers showed positive significant relationship. This indicated that as the education increased, the adoption of package of practices also increased. This inferred that, the respondents with higher level of education adopted package of practices to a greater extent.

This observation was conformity with findings of Kiranmayi (2013) and Sujatha B *et al.* (2015).

4.4.3.3 Land holding Vs extent of adoption

The computed r-value (-0.030NS) for land holding and extent of adoption of recommended package of practices of sugarcane farmers showed negative non-significant relationship. This indicates that land holding negatively influencing adoption of recommended package of practices. Farmers with land holdings were found subsistence in their farming and hence they could only practice less complex practices. Thus, the difference existed between farmers with small and big land holdings with their extent of adoption. The results were in accordance with the findings of sivanarayana (2000) and Dhamodaran (2001).

4.4.3.4 Farming experience Vs extent of adoption

The computed r-value (0.344**) for farming experience and extent of adoption of recommended package of practices of Turmeric farmers showed positive and significant relationship. Farmers who had more experience might know the potentiality, applicability and utility of recommended practices. The probable reason for this might be the fact that as the farmers gain knowledge through their experience in farming, they will try to adopt more in their field. Hence, the above trend was noticed. Similar trend was reported by Ambedkar (2010) and Sujatha B *et al.* (2015)

4.4.3.5 Family size Vs Extent of adoption

The computed r-value (0.128NS) for family size and extent of adoption of recommended package of practices of turmeric farmers showed positive non-significant relationship. This indicated that family size did not significantly influence extent of adoption of recommended package of practices increased.

Similar trend was reported by Singh and Chauhan (2010), Singh *et al* (2012), and Kiranmayi (2013).

4.4.3.6. Farm machinery Vs extent of adoption

The computed r-value (0.289**) for farm machinery status and extent of adoption of recommended package of practices of turmeric farmers showed positive and significant relationship. This indicated that as the farm machinery increased, extent of adoption of recommended package of practices also increased. This finding was in tune with Rao (1993).

4.4.3.7 Annual income Vs extent of adoption

The computed r-value (0.338**) for annual income and extent of adoption of recommended package of practices of sugarcane farmers showed positive significant relationship. This indicated that as the annual income increased, the adoption of package of practices also increased. This inferred that, the respondents with higher level of annual income adopted package of practices to a greater extent.

The result was in consonance with the findings of Singh *et al* (2012), Sandeep *et al* (2013) and Kiranmayi (2013).

4.4.3.8 Extension contact Vs extent of adoption

The computed r-value (0.570**) for extension contact and extent of adoption of recommended package of practices showed positive and significant relationship. This inferred that farmers had more contact with extension officers, acquire more knowledge about advanced developments. It helps the farmer to adopt new agricultural technologies in his farm. The results were in conformity with Kiranmayi (2013) and Sujatha B *et al.* (2015).

4.4.3.9 Occupation Vs extent of adoption

The computed r-value (-0.063NS) for occupation and extent of adoption of recommended package of practices showed negative and non-significant relationship. This indicates that there was an decrease in extent of adoption with increase in level of occupation. The reason might be with the increase of level of occupation, farmer may have less focus on the turmeric production technology and that leads to decrease in the adoption. This finding was in tune with the findings of Shehu *et al.* (2013).

4.4.3.10 Innovativeness Vs extent of adoption

The computed r-value (0.676**) for innovativeness and extent of adoption of recommended package of practices showed positive significant relationship. Innovativeness was associated with the individual's earliness in the use of new practices. The person who has more innovativeness acquires more knowledge from various sources and adopts the practices without any hesitation and this might be the reason for the above relationship. This result was in agreement with the result of Rathood (2005), Maraddi and Kumar (2008) and Ambedkar (2010)

4.4.3.11 Social participation Vs extent of adoption

The computed r-value (0.149NS) for social participation and extent of adoption of recommended package of practices showed positive and non-significant relationship. This indicates that there was an increase in extent of adoption with increase in social participation even though it was non-significant. The reason might be that the turmeric farmers are not having any cooperative societies. Some of the turmeric farmers are the members of PACS and Panchayats, discussing about the aspects of turmeric cultivation

This finding was in tune with the findings of Gopinath (2005) and Sujatha B *et al* (2015).

4.4.3.12 Mass media exposure Vs extent of adoption

The computed r-value (0.502**) for mass media exposure and extent of adoption of recommended package of practices showed positive significant relationship. It is natural that increased mass media exposure broadens the understanding and awareness on the adoption of recommended practices. The advantage of mass media provides enormous opportunities for repeated exposure to new technology, motivating the farmers for further action wherever and whenever a person was exposed to media with more frequency they are entitled to get more information and this in turn lead to better adoption of recommended practices by the Turmeric farmers. Hence, this trend was noticed.

This finding was in tune with the findings of Ambedkar (2010) and Kiranmayi (2013).

4.4.3.13 Market orientation Vs extent of adoption

The computed r-value (0.037NS) for market orientation and extent of adoption of recommended package of practices showed positive and non-significant relationship with extent of adoption of recommended package of practices. This might be due to the reason that inadequate transport facilities, poor communication within and outside the rural areas lack of complete belief on the regulated market and purchase by the middle men in the farm itself. This finding was in tune with the findings of Sreekantha verma *et al* (2011).

4.4.3.14 Economic orientation Vs extent of adoption

The computed r-value (0.563**) for economic orientation and extent of adoption of recommended package of practices showed positive and significant relationship. Farmers with more economic orientation would always try to increase the financial background through harvesting more yields from their farms for which adoption of recommended practices become essential. Hence, the above relationship was noticed.

This finding was in tune with the findings of Raghavendra (2004) and Gopinath (2005) and ambedkar (2010).

4.4.4 Multiple Linear Regression Analysis of Personal, Socio-economic and Psychological Characteristics of the Turmeric farmers with their Extent of Adoption

An attempt has been made to find out the amount of contribution made by the Personal, Socio-economic and Psychological Characteristics in explaining the variation in the dependent variable i.e. adoption towards Turmeric cultivation. The results were presented in Table 4.23

Table 4.23. Multiple linear regression analysis of personal, socio-economic and psychological characteristics of the turmeric farmers with their extent of adoption

(n =120)

S.No.	Personal, Socio-economic and Psychological Characteristics	Regression coefficient	Standard error	't' value
1.	Age	0.039	1.271	0.718
2.	Education	0.709	0.485	13.125**
3.	Land holding	-0.049	0.604	-1.280
4.	Farming experience	0.052	1.092	0.993
5.	Family size	-0.004	0.924	0.909
6.	Farm machinery status	0.050	0.190	1.204
7.	Annual income	0.017	0.394	0.419
8.	Extension contact	0.061	0.160	1.139*
9.	Occupation	0.014	0.600	0.357
10.	Innovativeness	0.061	0.206	1.041
11.	Social participation	0.016	0.261	0.416
12.	Mass media exposure	0.079	0.201	1.836**
13.	Market orientation	-0.009	0.219	-0.217
14.	Economic orientation	0.085	0.138	1.720**

a = 23.049 R^2 = 0.865

NS = Non significant * Significant at 0.05 level of probability

** Significant at 0.01 level of probability

From the above table the MLR equation can be fit as $Y = 23.049 + 0.718x_1 + 13.125^{**}x_2 + -1.280\ x_3 + 0.993x_4 + 0.909x_5 + 1.204x_6 + 0.419x_7 + 1.139^{*}x_8 + 0.357x_9 + 1.041x_{10} + 0.416x_{11} + 1.836^{**}x_{12} + -0.217x_{13} + 1.720^{**}x_{14}$

Table 4.23 revealed that the coefficient of determination "$R^{2"}$ value was significant, as the value of "a" was found significant. The "$R^{2"}$ value of 0.865 indicated that all the selected 14 independent variables put together, explained about 86.50 per cent variation in the extent of adoption of selected production technology by the turmeric farmers, remaining 13.5 per cent was due to the extraneous effects of the other variables. Hence, it could be stated that the Personal, Socio-economic and Psychological Characteristics selected to a large extent explained the variation in the extent of adoption of selected production technology by turmeric farmers.

The regression coefficient given in Table 4.23 further revealed that the independent variables namely education, mass media exposure, extension contact and economic orientation were found to be positively significant. Remaining independent variables viz., age, land holding, farming experience, family size, farm machinery status, annual income, occupation, innovativeness, social participation and market orientation were Non-significant in this analysis.

This implied that education, mass media exposure, extension contact and economic orientation were contributed significantly to the prediction of the variation in the extent of adoption of selected production technology of turmeric.

4.5 CONSTRAINTS OF TURMERIC FARMERS AND TO ELICIT THE SUGGESTIONS OF TURMERIC FARMERS

4.5.1 Constraints of Farmers in Turmeric Cultivation

Table 4.24.Constraints faced by the farmers in turmeric cultivation.

(n=120)

S.No.	Constraints*	Frequency	Percentage	Rank
1.	**Planting**			
a.	Inadequate knowledge about recognized source of seed material	49	40.83	IV
b.	Unavailability of high yielding and resistant seed material.	53	44.17	III
c.	Non-availability of information about seed treatment	62	51.67	II
d.	High cost of seed rhizomes	89	74.17	I
e.	Storage losses of seed rhizomes	34	28.33	V
2.	**Fertilizers**			
a.	Inadequate availability of manures and fertilizers	78	65.00	II
b.	High cost of manures and fertilizers.	84	70.00	I
c.	Inadequate knowledge on application of manures and fertilizers.	25	20.83	III
3.	**Irrigation**			
a.	Irregular power supply	73	60.83	I
b.	Insufficient availability of water	36	30.00	III
c.	Lack of knowledge on drip system	57	47.50	II
4.	**Plant protection**			
a.	Inadequate knowledge about symptoms of pest and diseases.	39	32.50	III
b.	Inadequate knowledge about recommended pesticides.	63	52.50	I
c.	Inadequate availability of pesticides.	21	17.50	IV
d.	Costly crop protection chemicals	58	48.33	II

5.	**Marketing**			
a.	Inadequate transportation facilities.	48	40.00	V
b.	Higher charges by commission ıts	75	62.50	III
c.	Fluctuations in market price	81	67.50	II
d.	Exploitation by middle men.	92	76.67	I
e.	Lack of knowledge about grading of turmeric rhizomes.	54	45.00	IV
6.	**Financial constraints**			
a.	Non-availability of credit in time	69	57.50	I
c.	High Interest rate and shorter repayment period.	51	42.50	II
7.	**Labour**			
a.	Non-availability of skilled labour.	61	50.83	III
b.	Non-availability of labour in time.	77	64.17	II
c.	High wages of labour.	81	67.50	I
8.	**Harvesting and storage**			
a.	Inadequate storage facility.	41	34.17	III
b.	Problem of pest in storage	51	42.50	II
c.	Unavailability of mechanical Harvesters	74	61.67	I
9	**Processing and post harvest technology**			
a.	Non-availability of steam boilers	82	68.33	I
b.	Inadequate knowledge about Processing	32	26.67	IV
c.	Non-availability of artificial driers	68	56.67	III
d.	Non availability of mechanical Polishers.	78	65.00	II
e.	Lack of knowledge about grading	17	14.17	V
10.	**Transfer of technology**			
a.	Apathetic nature of extension personnel.	53	44.16	II
b.	Non-availability of research station nearby.	83	69.16	I

(*Multiple Response Format)

A quick perusal of Table 4.24 indicated that there were many constraints noticed by turmeric farmers in adoption of selected production technology in percentage and rank order of their decreasing importance were presented below.

4.5.1.1 Planting

The data in Table 4.24 revealed that the constraints related to planting in percentage and rank order of their importance as high cost of seed rhizomes (74.17%), followed by insufficient knowledge about seed treatment (51.67%), Lack of high yielding and resistant seed material (44.17%), Inadequate knowledge about recognized source of seed material (40.83%) and insufficient knowledge about source of seed (25.00%). Hence, the Departments of Horticulture and Agriculture and Agricultural University, KVK'S, should provide good quality seed, make them aware about the suitable varieties for their area to increase the production.

4.5.1.2 Fertilizers

Constraints related to fertilizer management practices in percentage and rank order of their importance are insufficient availability of manures and fertilizers (70.00%), followed by High cost of manures and fertilizers (65.00%) and inadequate technical knowledge on application of manures and fertilizers (20.83%). Hence, the Government should make every effort to arrange for the timely supply of fertilizers on subsidized basis, and also impart knowledge on time, dosage and method of their application.

4.5.1.3 Irrigation

With respect to irrigation management, the problem of irregular power supply was identified as the severe constraint expressed by 60.83 per cent of the farmers, followed by Lack of knowledge on drip system (47.50%), and insufficient availability of water (30.00%) as important constraints in percentage rank order of their importance. In this regard, Department of Horticulture, Agriculture should make every effort to create awareness on irrigation management.

4.5.1.4 Plant protection

In case of plant protection measures, not enough knowledge about recommended of plant protection chemicals and their dosage (52.50%), Costly crop protection chemicals (48.33%), not enough knowledge about symptoms of pest and diseases (32.50%) and inadequate availability of pesticides (17.50%) were the constraints in percentage rank order of their importance. Hence, the Horticulture and Agricultural Universities should make every effort to impart knowledge to the turmeric farmers about dosage, time and method of application of plant protection chemicals.

4.5.1.5 Marketing

In case of marketing, constraints in percentage rank order of their importance are: exploitation by the middle men (76.67%), Fluctuations in market price (67.50%), Higher charges by commission agents (62.50%), lack of knowledge about grading of turmeric rhizomes (45.00%) and Inadequate transportation facilities (40.00%). In order to overcome the above said constraints, government should provide the favourable support price, establishment of marketing platforms for the turmeric nuts, strengthen the farmer factory linkages, eliminate the middlemen and must orient the farmers with regard to grading of turmeric.

4.5.1.6 Financial

In case of financial constraints, Lack of timely credit availability (57.50%), High Interest rate and shorter repayment period (42.50) were the constraints in percentage rank order of their importance. Hence, provision of timely credit at reasonable interest rates, long repayment period, proper exgratia in case of cyclones *etc*. will improve the financial condition of the farmers.

4.5.1.7 Labour

In case of labour constraints High wages of labour (67.50%), Non-availability of labour in time (64.17%) and Non-availability of skilled labour (50.83%) were the constraints in percentage and rank order of their importance.. For this, giving consideration for executing farm activities under MGNREGS by government and arrange training programmes by Department of Agriculture, Horticulture and Agricultural and Horticultural Universities.

4.5.1.8 Harvesting and storage

Lack of mechanical harvesters (61.67%) and inadequate storage facility (34.17%) were the major problems under harvesting and storage. In view of the larger area of turmeric plantations, provision of godowns for storing the harvested produce will help in getting the remunerative price.

4.5.1.9 Processing and post harvest technology

In case of Processing and post harvest technology, lack of steam boilers (68.33), Non availability of mechanical Polishers (65.00), Non-availability of artificial driers (56.67), Inadequate knowledge about Processing (26.67), Lack of knowledge about grading (14.17).

4.5.1.10 Transfer of technology

Non-availability of research station nearby (69.16%) and Low credibility of extension personnel (44.16%) were the constraints under transfer of technology, expressed by turmeric farmers in percentage rank order of their importance. To solve these constraints, government and horticultural university should strengthen the farmer-extension linkages, arranging timely training programmes to the farmers with the help of scientists and extension.

4.5.2 Suggestions of Turmeric Farmers to Overcome the Problems in Adoption of Selected Production Technology.

Turmeric farmers were asked to make suggestions to overcome the problems in adoption of selected production technology. The suggestions along with their ranks were given in Table 4.25

Table 4.25. Suggestions elicited by turmeric farmers to arrive at the strategy for increasing production

(n=120)

S.No.	Suggestions*	Frequency	Percentage	Rank
1	Making timely availability of quality seed material	84	67.50	III
2	Timely provision of fertilizers on subsidy	71	59.17	V
3	Timely technical guidance to the farmers	43	35.83	X
4	Demonstration on seed treatment technique	91	75.83	II
5	Timely provision of credit facility at lower interest	58	48.33	VII
6	Establishment of turmeric research station near by	47	39.17	IX
7	Provision of advanced turmeric processing machinery on subsidy	78	65.00	IV
8	Evolving suitable varieties with rhizome rot resistance	98	81.67	I
9	Supplying steam boilers on subsidy basis	66	55.00	VI
10	Elimination of middlemen	51	42.50	VIII
11	Farmers rallies, exhibition on turmeric crop should be organized	33	27.50	XI

(*Multiple Response Format)

Table 4.25 clearly showed that suggestions elicited from the turmeric farmers in percentage rank order of their decreasing importance as: Evolving suitable varieties with rhizome rot resistance (81.67%), Demonstration on seed

treatment (75.83%), Making timely availability of quality seed material (67.50%), Provision of advanced turmeric processing machinery on subsidy (65.00%) Timely provision of fertilizers on subsidized rates (59.17), Supplying steam boilers on subsidy basis (55.00%), Timely provision of credit facility at lower interest (48.33%), Elimination of middlemen (42.50%), Establishment of turmeric research station nearby (39.17%), Timely technical guidance to the farmers (35.83%), Exhibition on turmeric crop should be organised (27.50%) of turmeric farmers to arrive at a strategy for increasing production.

From the table 4.25, it was conclude that most of the turmeric farmers suggested for the supply of the rhizome rot resistant variety.

Secondly, they suggested for the demonstration of seed treatment procedure which was very important for control of the rhizome fly and rhizome rot

The turmeric farmers also suggested making timely availability of quality seed material with subsidy cost because turmeric crop requires more seed rate.

As most of the turmeric farmers suggested for Provision of advanced turmeric processing machinery on subsidy because there was a great shortage of labour and high wages rates.

Turmeric farmers suggested for timely provision of fertilizers on subsidized rates. They also suggested for the supply of the steam boilers for boiling rhizomes on the subsidy basis because, in traditional method it requires more time and labour, if steam boilers were engaged for boiling of the turmeric rhizomes will become easier.

Turmeric farmers also anticipated for the elimination of middlemen because even though there was a regulated market for selling of the turmeric produce many farmers were selling produce to the middle man because most of the farmers have debits which have to be paid immediately.

Establishment of the Turmeric Research Station in the district was suggested by some of the turmeric farmers as there is larger area under Turmeric, so that, the scientists can come nearer to the turmeric farmers and attend to their problems of cultivation.

Timely provision of credit facility will enable the turmeric farmers to follow the production technology of turmeric in time and to get good yields.

Thus, it was the responsibility of the Government, Extension agency and Research institutions to provide the above suggested facilities to the turmeric farmers for better adoption of selected production technology of turmeric.

Among above suggestions few turmeric farmers also suggested the demonstrations on bud chip method of raising turmeric seedlings by which seed rate can be reduced drastically.

4.6 FEW TYPICAL CASELETS OF TURMERIC FARMERS.

Case let-I "Savouring success with turmeric cultivation"

Mr. Vemullapalli Rathna Gopal Rao was a 48 years old B.Sc graduate turned turmeric farmer residing at peddakondur village of Duggirala mandal of Guntur district. His main occupation was agriculture. He grows turmeric, banana *etc.* Here was a brief portray of this prosperous turmeric grower.

1. Name	:	Vemullapalli Ratna Gopal Rao
2. Age	:	48 years
3. Occupation	:	Agriculture
4. Land holding	:	10 acres
5. Annual income (Rs.)	:	2,50,000/-
6. Farming experience	:	25 years
7. Cropping system	:	Turmeric, maize, banana, *etc.*
8. Live stock	:	Two milch cows
9. Soil type	:	Black soil
10. Varieties cultivated	:	Seelam, Duggirala
11. Yield obtained (per acre)	:	25 quintals/acre

12. Contact with extension agency : Agricultural officer (AO) and Agricultural Extension Officer (AEO)
13. Contact with Turmeric market : Turmeric yard, Duggirala
14. Innovations adopted : Seed treatment, steam boilers, drip system.
15. Plant protection practices adopted: Application of neem cake and seed treatment with Dimethoate (rhizome fly), seed treatment with Dithane M-45 and malathion for 30 miuntes. sprayed , Dithane M- 45 and bavistin for control of leaf blotch and leaf spot.
16. Post-harvest technologies : Steam boilers for boiling of turmeric rhizomes and polishers.
17. Material possession : Tractor, Sprayer, steam boiler *etc.*
18. Participation in agricultural programmes: Kisan mela, agricultural exhibitions training programmes and demonstrations.
19. Future plans reduced. : To adopt portray method for me seedlings. so that seed growing rate reduced

Case let-II "Cash from turmeric"

Mr. Venkateswar Rao, aged 48 years, a farmer of Vellatur village of Bhattiprolu mandal of Guntur district. He has completed high school education and is presently engaged in agriculture endeavor. Here by an earnest effort was made to present a successful caselet of this dynamic farmer.

1. Name : Venkateswar rao Lukka
2. Age : 48 years
3. Occupation : Agriculture and dairy
4. Land holding : 8 acres
5. Annual income (Rs.) : 4,50,000/-
6. Farming experience : 15 years

7. Cropping system	:	Turmeric, Maize.
8. Irrigation source	:	Bore well
9. Live stock	:	Five milch cows
10. Soil type	:	Black
11. Varieties cultivated	:	Duggirala, Seelam
12. Yield obtained (per acre)	:	30 quintal/acre.
13. Membership in social organizations	:	Member of co-operative society.
14. Contact with extension agency	:	Agricultural Extension Officer (AEO), Agricultural officer (AO) and Adarsha rythu
15. Contact with Turmeric market	:	Turmeric yard, duggirala
16. Innovations adopted	:	Seed treatment, organic farming, drip system
17. Plant protection practices adopted	:	Application of propiconazole for turmeric leaf spot. seed treatment with DM-45 and malathion for 30 miuntes.
18. Post-harvest technologies	:	Steam boilers for boiling of turmeric rhizome.
19. Material possession	:	Tractor, Mould board plough, Pick axe *etc.*
20. Participation in agricultural programmes	:	Kisan mela, agricultural exhibitions, training programmes.

Caselet-III "Utilizes expert advices leads to a substantial yield"

Mr. Jagapathi Rao was an 50 years old Turneric farmer residing at Bommuvaripalem village of Kollipara mandal of Guntur district. His main occupation was agriculture. He grows turmeric, paddy, vegetables *etc.* Here was a brief portray of this prosperous Turmeric grower.

1. Name	:	Jummati Jagapathi Rao
2. Age	:	50 years
3. Occupation	:	Agriculture
4. Land holding	:	6 acres
5. Annual income(Rs.)	:	3,50,000/-

6. Farming experience	:	20 years
7. Cropping system	:	Turmeric, paddy, vegetables
8. Live stock	:	one milch cow
9. Soil type	:	Black
10. Varieties cultivated	:	Duggirala, kadapa
11. Yield obtained (per acre)	:	35 quintal/acre.
12. Membership in social organizations	:	Member in Rythu Mithra Group.
13. Contact with extension agency	:	Agricultural Extension Officer (AEO), Agricultural Officer (AO) and Adarsha rythu
14. Contact with Turmeric market	:	Turmeric yard, duggirala
15. Innovations adopted	:	Steam boilers, Seed treatment, Drip system.
16. Plant protection practices adopted	:	seed treatment with Dithane M-45 and malathion for 30 miuntes. sprayed Dithane M- 45 and Bavistin for control of leaf blotch and leaf spot, for control of pests he used Neem cake with lower dosage of pesticides
Post-harvest technologies	:	Steam boilers for boiling of turmeric rhizome and mechanical polisher
17. Material possession	:	Tractor, M B plough, Pick axe *etc.*
18. Participation in agricultural programmes	:	Agricultural exhibitions, Kisan mela, training programmes.

Caselet-IV "The Turmeric cultivar"

Mr. Madhav Reddy A, aged 38 years, a farmer of munnangi village of kollipara mandal of Guntur district. He has completed intermediate and is presently engaged in agriculture endeavour. Here by an earnest effort was made to present a successful case let of this dynamic farmer.

1. Name	:	Madhav Reddy Alla
2. Age	:	38years
3. Occupation	:	Agriculture

4. Land holding	:	12 acres
5. Annual income(Rs.)	:	4,20,000/-
6. Farming experience	:	10 years
7. Cropping system	:	Turmeric, Maize, banana, corm
8. Live stock	:	Three milch cows
9. Soil type	:	Black
10. Varieties cultivated	:	Kadapa, Duggirala.
11. Yield obtained (per acre)	:	35 quintal/acre.
12. Contact with extension agency	:	Agricultural Extension Officer (AEO), Agricultural Officer (AO).
13. Contact with Turmeric market	:	Turmeric yard, Duggirala
14. Innovations adopted	:	Seed treatment, drip system, steam boiler for turmeric processing and polisher
15. Plant protection practices adopted	:	Sprayed Dithane M-45 and Bavistin for control fo leaf blotch and leaf spot, for control of pests he used neem cake with lower dosage of pesticides.
16. Post-harvest technologies	:	Steam boilers for boiling of turmeric mechnical polisher for polishing.
17. Material possession	:	Polisher, Tractor, Mould board plough, Pick axe *etc.*
18. Participation in agricultural	:	Kisan mela, Agricultural exhibitions programmes Training programmes

Case let-V "Turmeric Farmer"

Mr. Dulla Siva Ganta Babu was a 56 years old Post Graduate turned Turmeric farmer residing at chinnapalem village of Duggirala mandal of Guntur district. His main occupation was agriculture and poultry. He grows Turmeric, Banana, vegetables *etc.* Here is a brief portray of this prosperous Turmeric grower.

1. Name	:	Dulla Siva Ganta Babu
2. Age	:	56 years
3. Occupation	:	Agriculture and poultry

4.	Land holding	:	6 acres
5.	Annual income(Rs.)	:	3,25,000/-
6.	Farming experience	:	35 years
7.	Cropping system	:	Turmeric, banana.
8.	Varieties cultivated	:	Duggirala, Kadapa
9.	Yield obtained (per acre)	:	25 quintal/acre
10.	Membership in social organizations	:	Member in Gram panchayat.
11.	Contact with extension agency	:	Agricultural extension officer (AEO), Agricultural officer (AO
12.	Contact with Turmeric market	:	Turmeric yard, Duggirala
13.	Innovations adopted	:	Steam boiler, Drip system
14.	Plant protection practices adopted	:	Seed treatment with Dithane M-45 and malathion for 30 miuntes. Sprayed Dithane M- 45 and Propiconazole for control of leaf blotch and leaf spot, for control of pests he used Neem cake with lower dosage of pesticides.
15.	Post-harvest technologies	:	Mechanical harvester, steam boilers for boiling of turmeric rhizome and polisher.
16.	Material possession	:	Tractor, M B plough,Pick axe *etc.*
17.	Participation in agricultural programmes:		Agricultural exhibitions, Demonstration training programmes.

From the above caselets, it was observed that turmeric farmers have adopted innovations like use of improved high yielding turmeric varieties, seed treatment, integrated nutrient management, drip irrigation system, mechanical harvester, steam boilers, and polisher *etc.*, by participating in agricultural programmes like kisan mela, agricultural exhibitions, training programmes and demonstrations and they had high social participation and more extension contact with horticultural and agricultural extension officers. To reduce seed rate they were planning to adopt portray method of transplanting seedlings. They were also planning to adopt intercropping in turmeric with maize.

4.7 EMPIRICAL MODEL OF THE STUDY

The Fig.4.17 Indicated that the personal, socio-economic and psychological characteristics of the turmeric farmers like age, education, farming experience, extension contact, innovativeness, social participation, mass media exposure and economic orientation showed significant relationship with level of knowledge of recommended practices of turmeric. Therefore, it could be concluded that there was an increase in knowledge of turmeric farmers with increase in these characteristics.

The Fig. 4.17 also indicated that there was a significant correlation between age, education, farming experience, farm machinery status, annual income, extension contact, innovativeness, mass media exposure and economic orientation with extent of adoption of recommended practices in turmeric. This clearly showed that there was an increase in extent of adoption with the increase in these characteristics.

So, it could be implied that except land holding, family size, farm machinery status, annual income, occupation and market orientation all other variables in the figure significantly associated with extent of knowledge. Land holding, family size, occupation and market orientation showed non-significant relationship with extent of adoption.

Chapter II

REVIEW OF LITERATURE

A comprehensive review of literature is of paramount importance to any research endeavour, as it not only gives an idea on the work done in the past and assists in delineation of problem area but also provides basis for interpretation and discussion of findings. It acts as a torchbearer for the researcher to get an insight into methods and procedures. Review of literature helps to identify the gaps in research and to document the events relating to a particular aspect of investigation. An acquaintance with earlier pertinent studies has been felt necessary to develop good understanding of the study. The thesis work is concerned with "A STUDY ON THE KNOWLEDGE AND ADOPTION OF TURMERIC FARMERS IN GUNTUR DISTRICT OF ANDHRA PRADESH". Hence, the efforts were made to review the related literature, which was found to be meaningful and having direct or indirect bearing on this study and furnished under the following heads, in line with the objectives of the study.

2.1 Personal, socio-economic and psychological characteristics of turmeric farmers.

2.2 Extent of knowledge of turmeric farmers on selected production technology.

2.3 Extent of adoption by turmeric farmers on selected production technology practices.

2.4 Relationship of the personal, socio-economic and psychological characteristics of turmeric farmers with their level of knowledge and extent of adoption.

2.5 Few typical caselets of turmeric farmers.

2.6 Constraints of turmeric farmers in adoption of selected production technology and Suggestions elicited by the turmeric farmers and arrive at the strategy for increasing the production.

2.7 Conceptual model for the study.

2.1 PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF TURMERIC FARMERS

2.1.1 Age

Rahul (2003) in his study on papaya growers found that a little less than two fifth of them were middle age (38.33%), followed by young (31.67%) and old age (30.00%).

Shashidhar (2004) found that the majority of the horticulture farmers had middle age (48.33%) category followed by young age (31.66%) and old age (20.00%) categories.

Gowda (2009) observed that less than three fourth of the sugarcane growers were middle age (70.83%), followed by young age (16.67%) and old age (12.50%) categories.

Madhushekar (2009) reported that a little less than two fifth of the chilli growers belonged to middle age (37.50%) category, followed by young age (35.00%) and old age (27.50%) categories.

Ram *et al.* (2010) observed that a little less than three fourth of vegetable growers fall in middle age (73.30%) group, followed by young age (14.70%) and old age (12.00%) groups.

Prashanth (2011) observed that little more than half of the organic cotton farmers belonged to middle age (53.33%), followed by young (36.67%) and old (10.00%) age whereas little less than half of the conventional cotton farmers were middle age (48.33%) followed by old (31.67%) and young age (20.00%) categories.

Archana (2012) reported that little more than two fifth of the castor farmers belonged to middle age (40.83%), followed by the remaining belonging to old age (32.50%) and young age (26.67%) categories.

Nirmala (2012) observed that less than three fifth of the SRI paddy growers belonged to middle age (57.50%), followed by the rest belonging to young (32.50%) and old age (10.00%) categories.

Sravan Kumar (2012) reported that nearly two third (60.00%) of vermicompost entrepreneurs belonged to middle age group followed by the remaining belonging to young age group (26.66%) and old age (13.33%) group.

Kiranmayi (2013) reported that more than half of the chilli farmers belonged to middle age (66.67%), followed by the rest belonging to young age (21.67%) and old age (11.66%) categories.

Ramalakshmi Devi *et al*. (2013) revealed that majority (57.50%) of the Sugarcane farmers belong to middle age group, followed by those to young (31.67%) and old age (10.83%) groups.

Randhir singh *et al*. (2014) stated that majority of the wheat farmers (64.38%) belonged to middle and the remaining belonged to old (24.37%) and young (11.25%) age groups.

Remadas *et al*. (2015) concluded that highest proportion (53.33%) of the vegetable farmers was in middle age group (36-50 years) as compared to old age group 28.33 per cent and only 18.33 per cent in young age group.

2.1.2 Education

Mate (2006) found that more than 93.00 per cent of potato growers were educated, out of which 55.00 per cent received secondary education.

Hawale (2009) reported that 62.25 per cent of custard apple respondents farmers were educated upto secondary education while 23.30 per cent and 14.45 per cent of the respondents received primary and college level education.

Balu Naik and Ramesh Babu (2010) found that 24.16 per cent of the FFS farmers were educated upto high school level, followed by 20.84 per cent with middle school, 16.67 per cent with illiterates, 13.33 per cent with primary school, 12.50 per cent with intermediate education, 11.67 per cent with graduate and 0.83 per cent with post graduate education.

Chapke *et al*. (2011) found that most (60.00%) of the sorghum farmers were illiterate, followed by a few of them educated upto middle school (16.50%), higher secondary (13.50%) and graduate (10.00%) level.

Gowda *et al.* (2011) revealed that 33.33 per cent of the sugarcane growers had high school education, followed by those with collegiate education (21.67%), while 14.17 per cent belonged to middle school, 12.50 per cent to primary school, 10.83 per cent to illiterates, 4.17 per cent of respondents can read and write and 3.33 per cent of respondents can read only categories.

Meena *et al*. (2012) observed that majority (57.50%) of the rice farmers were educated upto medium level (medium to high school), followed by those with low (primary) education (24.50%) and high education i.e. above high school (18.00%).

Nrusimha Kalyan *et al.* (2012) found that majority (23.34%) of the groundnut farmers were educated up to middle school level followed by those with illiterate (20.00%), functionally literate (13.33%), primary school (13.33%), high school (12.50%), intermediate (10.83%) and only 06.67 per cent were educated upto collegiate level.

Tidke *et al*. (2012) found that majority (70.00%) of the pigeonpea farmers were educated upto high school level, followed by those educated upto middle school (13.33%), collegiate education and primary school (06.67% each) and only 03.33 per cent of them were illiterates.

Ramalakshmi Devi *et al*. (2013) revealed that most (90.83%) of the sugarcane farmers were educated. Whereas, 4.17 per cent were functionally literate and only 5.00 per cent were illiterates.

Remadas *et al*. (2015) revealed that maximum of the vegetable growing farmers (61.66%) were confined to a education level up to secondary followed by primary (18.33%).

2.1.3. Land Holding

Rahul (2003) reported that a little less than half of the papaya growers had small land holding (46.67%), followed by those with medium land holding (31.67%) and large land holding (21.66%).

Gopinath (2005) revealed that less than half of the bengalgram farmers had small land holding (49.34%), followed by the rest with medium land holding (31.33%) and big land holding (19.33%).

Gopiram (2005) revealed that majority of the turmeric farmers had medium land holding (52.00%), followed by the rest with small (32.00%) and large (16.00%) land holding.

Mate (2006) reported that 55.50 per cent of the respondent potato growers were having medium size of land holding (2.01 to 4.00 ha) followed by 28.50 per cent of them had small size of land holding (less than 2.00 ha) and the remaining 16.00 per cent had large size of land holding (more than 4.01 ha).

Man and Sadiya (2009) found that majority (81.20%) of rice farmers had a small farm followed by medium (15.60%) and large (3.20%).

Painkra *et al.* (2010) revealed that majority of the paddy growers *i.e.* 64.16 per cent belonged to small and marginal farmers category, followed by semi medium 20 per cent and 5 per cent farmers belonged to large farmers category

Archana (2012) reported that less than half of the castor respondents had small farm size (46.67%), followed by rest with marginal (29.17%) and large (24.16%) farm size.

Nirmala (2012) observed that majority (55.83 %) of the SRI paddy growers were small farmers followed by semi medium (30.00%), medium (7.50%), marginal (4.17%) and large (2.50%) categories

Ramalakshmi Devi *et al*. (2013) found that majority (54.17%) of the sugarcane farmers were small farmers, followed by the rest coming under big (42.50%) and marginal (03.33%) farmers categories.

Kiranmayi (2013) revealed that more than half of the chilli farmers were semi-medium farmers (56.67%), followed by the remaining as medium farmers (23.33%) and small farmers (20.00%).

Remadas *et al*. (2015) observed that the highest percentage of farmers (41.66%) were marginal farmers followed by small farmers (38.33%) and medium farmers (20.00%).

2.1.4. Farming Experience

Gopiram (2005) found in his study that a little less than three fifth of the turmeric farmers had medium farming experience (58.67%), followed by the rest having high (22.00%) and low (19.33%) farming experience.

Naik (2006) from his study revealed that a little less than two fifth of groundnut farmers had medium farming experience (39.33%), followed by the rest with high (34.67%) and low (26.00%) farming experience.

Karpagam (2007) reported that a little more than two third of the grape growers had medium farming experience (67.50%), followed by the remaining having low (17.50%) and high (15.00%) farming experience.

Hawale (2009) reported that, 74.10 per cent of the respondent custard apple cultivators were in the category of medium experience while 15.56 per cent of the growers were in the category of low experience followed by 10.34 per cent high experience in custard apple cultivation.

Madhushekar (2009) reported that a little more than two fifth of the chilli growers had medium farming experience (41.25%), followed by the rest having low (37.50%) and high (21.25%) farming experience.

Arathy (2011) found that majority of the rice farmers had medium level (49.17 %) of farming experience followed by high (30.00%) and low (20.83%).

Kalyan (2011) found that majority of the groundnut farmers had medium farming experience (65.00%) followed by high (19.16%) and low farming experience (15.83%).

Thiyagarajan (2011) reported that majority of the SRI farmers (46.70%) had medium level of farming experience, followed by 30.80 per cent with low level of farming experience and the remaining 22.50 per cent of the SRI farmers had high level of farming experience.

Nirmala (2012) observed that more than half of the SRI paddy growers had medium farming experience (52.50%), followed by the remaining with low (30.00%) and high (17.50%) farming experience.

Kiranmayi (2013) stated that half of the chilli farmers had medium (50.00%) farming experience, followed by the rest with high (33.33%) and low (16.67%) farming experience. In case of tenant farmers, a little less than half of the respondents had medium (46.67%) farming experience, followed by the rest having high (28.33%) and low (25.00%) farming experience.

Kumar *et al.* (2013) revealed that majority of the vegetable growers had medium farming experience (71.66%), followed by the remaining having high (15.00%) and low (13.33%) farming experience.

Ramalakshmi Devi *et al*. (2013) revealed that majority (69.17%) of the sugarcane farmers had medium farming experience, followed by those with low (45.83%) and high (15.00%) levels of farming experience.

Praveenbabu *et al*. (2016) stated that majority (53.33%) of paddy farmers had high level of farming experience followed by medium (30.83%) and low (15.84%) farming experience.

2.1.5. Family Size

Raghunandan (2004) reported that a little more than three fifth of the respondents belonged to medium (61.25%) family size, followed by the remaining with big (25.00%) and small (13.75%) family size.

Mate (2006) pointed out that,\ 57.00 per cent of the potato growers were in the medium size family (5 to 8 members) while 31.00 per cent members had large family size (9 and above members).\

Sagar and Vijay (2006) reported that a little less than three fifth of the mushroom growers belonged to medium (57.58%) family size, followed by the rest belonged to small (24.24 %) and large (18.18%) family size.

Gautam *et al.* (2007) revealed that more than half of the dairy farmers belonged to small family size (69.2%), followed by the remaining belonged to medium (29.6%) and large (1.3%) family size

Meena *et al*. (2009b) reported that more than half of the horticultural farmers belonged to medium family size (65.00%) whereas the remaining 35.00 per cent belonged to large family size.

Manjunath (2010) found that a little less than three fifth of the paddy respondents belonged to small family size (57.14%), followed by the rest belonged to medium family (31.46%) and large family (11.40%) size.

Cavane (2011) reported that more than half of the maize growers belonged to small family size (65.8%), followed by the remaining belonged to medium (25.0%) and large (9.2%) family size.

Kiranmayi (2013) revealed that a little more than half of the chilli farmers belonged to medium (61.67%) family size, followed by the rest belonged to large (23.33%) and small (15.00%) family size.

2.1.6. Farm Machinery Status

Singh (1987) while examing modern farm technology and the important constraints operating in its transfer in tribal areas of Nanded district in Maharashtra reported that tribal farmers possessed few and primitive agricultural implements and used completely wooden plough without any iron blade attached to it.

Zotawana (1987) found that 50.00 per cent of trained and 78.00 per cent of untrained tribal farmers belonged to low farm power group.

Prasad (1990) observed that majority (78.00 %) of tribal farmers had average level of farm implements and machinery followed by those with high (15.00%) and low (7.00%) level of farm implements and machinery.

Rao (1993) reported that majority (62.50%) of the tribal farmers had medium farm power followed by the rest with high (20.10%) and low (17.40%) farm power.

Sankara Rao (1995) reported that 80.00 per cent of the tribal farmers had medium farm power and 20.00 per cent of farmers had low farm power.

Archana (2012) reported that majority of the respondents had low farm machinery status (39.17%), followed by those who had medium (36.67%) and high (24.16%) farm machinery status.

2.1.7. Annual Income

Shashidhar (2004) in his study revealed that two fifth of the horticulture respondents belonged to medium (40.00%) annual income category, followed by the rest belonged to low (30.00%) and high (30.00%) annual income categories.

Suresh (2004) reported that majority of the dairy farmers belonged to medium (80.00%) annual income, followed by high (15.00%) and low (5.00%) annual income categories.

Mate (2006) revealed that, 64.50 per cent of the potato growing respondents had medium annual income between Rs. 40,001/- to 80,000/-.

Nagabhushana (2007) reported that majority (56.67%) of potato farmers fell under medium income category, followed by the rest with low income (23.33%) and high (20.00%) income categories.

Kapse *et al.* (2009) reported that majority (58.00%) of banana growers had medium income level, followed by the remaining having high (22.66%) and low (19.34%) income levels.

Kaushalkumar (2009) revealed that less than three fourth of the pineapple growers belonged to medium annual income (71.11%), followed by the rest belonged to high (15.56%) and low (13.33%) annual income.

Nrusimha Kalyan *et al*. (2012) found that more than three-fifth (65.00%) of the groundnut farmers had medium annual income, followed by the remaining with high (19.17%) and low (15.83%) levels of annual income.

Tidke *et al*. (2012) stated that majority (70.00%) of Pigeonpea farmers had medium annual income, followed by those with high (16.67%) and low (13.33%) levels of annual income.

Mohanty *et al*. (2013) found that 43.34 per cent of the tribal farmers had low level of annual income, followed by those belonged to medium level (34.17%), poor (13.33%) and high (09.16%) level of income categories.

Kiranmayi (2013) revealed that half of the chilli farmers had high (50.00%) annual income, followed by the rest with medium (40.00%) and low (10.00%) annual income.

Rathod *et al*. (2013) reported that half of the soybean farmers had high annual income (50.00%), followed by the rest with medium (40.00%) and low (10.00%) annual income.

Praveenbabu *et al*. (2016) stated that majority (66.67%) of paddy farmers had medium level of annual income followed by low (18.33%) and high (15.00%) levels of annual income.

2.1.8. Extension Contact

Sivasubramanian (2003) observed that a little more than three fifth of the coconut growers had medium (60.84%) extension contact, followed by the rest with low (30.83%) and high (8.33%) extension contact.

Kumar (2004) revealed that half of coconut farmers had medium (50.00%) extension contact, followed by those having low (28.67%) and high (21.33%) extension contact.

Ramya (2005) revealed that majority (47.78%) of the curry leaf growers had medium level of extension contact followed by high (35.55%) and low (16.67%) levels of extension contact.

Gopinath (2005) reported that a little less than half of the bengalgram farmers had medium (46.00%) extension contact, followed by those with low (32.67%) and high (21.33%) extension contact.

Gopiram (2005) reported that a little less than two third of the turmeric farmers had medium (64.00%) extension contact, followed by the remaining having high (18.67%) and low (17.33%) extension contact.

Karpagam (2007) observed that a little more than half of the grape growers had medium (52.50%) extension contact, followed by the rest having low (32.50%) and high (15.00%) extension contact.

Sivanarayana *et al.* (2008) reported that majority (85.00%) of the cotton farmers were having medium extension contact followed by high (15.00%) level of extension contact.

Gowda (2009) observed that a little less than two third of the sugarcane growers had medium (65.83%) extension contact, followed by the remaining with low (20.00%) and high (14.17%) extension contact

Arathy (2011) reported that majority of the rice farmers had medium (46.67 %) extension contact followed by low (32.50%) and high (20.83%) levels of extension contact.

Kalyan (2011) revealed that 56.66 per cent of the groundnut farmers were having medium extension contact followed by low (26.66%) and high (16.66%) extension contact.

Nrusimha Kalyan *et al.* (2012) found that majority (56.66%) of the groundnut farmers had medium extension contact, followed by those with low (26.66%) and high (16.66%) levels of extension contact.

Tidke *et al*. (2012) observed that more than three-fourth (76.67%) of the pigeon pea farmers had medium extension contact, followed by the remaining with low (13.33%) and high (10.00%) levels of extension contact.

Choudhary *et al*. (2013) observed that 41.25 per cent mango growers were found to have contact with extension personnel once in two months, followed by those with once in a month (26.25%), no contact (22.50%) and only 10.00 per cent of the respondents had contact of once in a fortnight.

GaneshKumar *et al.* (2013) revealed that majority (61.11%) of the chickpea farmers had low level of extension contact, followed by those with medium (27.77%) and high (11.11%) levels of extension contact.

Mohanty *et al*. (2013) concluded that 46.67 per cent of the tribal farmers were having low level of extension agency contact, followed by those with moderate (40.00%) and high (13.33%) levels of extension agency contact.

Kiranmayi (2013) indicated that a little more than half of the chilli farmers belonged to medium (56.67%) extension contact category, followed by the rest having high (25.00%) and low (18.33%) extension contact categories.

Ramalakshmi Devi *et al.* (2013) found that majority (63.33%) of the sugarcane farmers had medium extension contact, followed by the rest with high (22.50%) and low (14.17%) levels of extension contact.

Praveenbabu *et al*. (2016) stated that majority (65.83%) of paddy farmers had medium extension contact followed by high (18.34%) and low (15.83%) levels of extension contact.

2.1.9. Occupation

Immaneul and Kangasabapathy (2005) observed that nearly 38.67 per cent of them had fishing alone as their main occupation and 61.33 per cent of them were involved both in fishing and farming.

Meshram *et al.* (2006) revealed that 53.33 per cent beneficiaries were engaged in farming, whereas 46.67 per cent of the beneficiaries in dairy farming.

Saha *et al.* (2010) revealed that higher per cent (30.00%) of livestock farmers were engaged in business followed by cultivation (24.42%), agricultural labour (20.83%), service (17.92%) and other independent profession (5.83%).

Gowda *et al.* (2011) clearly indicated that majority of the sugarcane growers (49.17%) were dependent only on agriculture. Whereas 47.50 per cent of the respondents were practicing both agriculture and dairy/ poultry, while 3.33 per cent of respondents practice was agriculture + dairy/ poultry + other occupation.

Neethi and Sailaja (2013) stated that majority (49.17%) of respondents belonged to labour (in own land, hired) + agriculture group followed by 22.50 per cent who belonged to agriculture + caste occupation group, 11.67 per cent belonged to agriculture + service group and 11.67 per cent belonged to agriculture + business groups respectively.

Amitendu De *et al.* (2014) clearly indicated that majority of the livestock respondents are having labour (48.70%) as occupation followed by farming (24.46%), service (10.79%), caste based occupation (8.12%) and business (7.19%).

Arun (2014) stated that nearly three fourths (72.00 per cent) of the respondents had agriculture + broiler farming as their occupation and the rest (28.00 per cent) of them had agriculture + broiler farming + others as their occupation.

Singh *et. al.* (2014) stated that majority of wheat farmers (50.67%) have cultivation as occupation followed by business (19.67%), caste occupation (14.00%), labour (11.33%) and service (4.33%)

2.1.10. Innovativeness

Gopinath (2005) observed that more than half (51.33%) of the bengalgram farmers had medium innovativeness, followed by the remaining with low (31.33%) and high (17.34%) levels of innovativeness.

Premavathi (2005) inferred that majority (64.00%) of the farm women had high innovativeness followed by the rest with medium (36.00%) innovativeness.

Asokhan *et. al.* (2008) evidenced that nearly half (47.33%) of the SHG members had high level of innovativeness, followed by 43.67 per cent with medium and 09.00 per cent with low level of innovativeness.

Balu Naik and Ramesh Babu (2010) reported that more than two-fifth (40.84%) of the FFS farmers were having high level of innovativeness, followed by those with medium (39.16%) and low (20.00%) levels of innovativeness.

Patil *et al.* (2010) reported that more than half (53.57%) of the organic vegetable growers had high innovativeness, followed by the remaining coming under medium (32.14%) and low (14.19%) levels of innovativeness.

Gowda *et al.* (2011) reported that more than two-third (68.33%) of sugarcane growers had medium innovativeness, followed by the rest coming under low (22.50%) and high (9.17%) innovativeness categories.

Prabhugouda (2011) revealed that majority (71.67%) of pomegranate growers had medium innovativeness, followed by those with high (15.00%) and low (13.33%) level of innovativeness categories.

Nrusimha Kalyan *et al.* (2012) found that nearly three-fifth (59.17%) of the groundnut farmers had medium level of innovativeness, followed by the rest with high (20.83%) and low (20.00%) levels of innovativeness.

Tidke *et al*. (2012) revealed that 40.00 per cent of the Pigeonpea farmers had medium level of innovativeness and an equal percentage coming under low and high levels of innovativeness (30.00% each).

Sravan Kumar (2012) reported that majority (58.33%) of vermicompost entrepreneurs had medium innovativeness, followed by those belonging to high (21.67%) and low (20.00%) innovativeness categories.

Ganesh Kumar *et al.* (2013) concluded that more than two-fifth (43.33%) of the chickpea farmers had medium innovativeness, followed by low (32.22%) and high (24.44%) levels of innovativeness

Jeevan Kumar (2013) observed that majority (72.50%) of the AELP students are having medium level of innovativeness followed by those with low level of innovativeness (17.50%) and high level of innovativeness (10.00%).

Ramalakshmi Devi *et al*. (2013) revealed that almost two-third (65.83%) of the sugarcane farmers had medium innovativeness, followed by the remaining with high (17.50%) and low (16.67%) innovativeness.

Praveenbabu *et al*. (2016) stated that majority (66.60%) of paddy farmers had medium innovativeness followed by high (18.40%) and low (15 %) levels of innovativeness.

2.1.11. Social Participation

Senthil Kumar (2000) revealed that most of the respondents (69.01%) were not members of any organization and 21.66 per cent were members in one organization, 8.33 per cent of respondents were office bearers in one organization and only less than 1.00 per cent of them were office bearers in more than one organization.

Veerendranath (2000) revealed that majority of castor growing farmers (50.00%) had no membership in any organization, 32.22 per cent had membership in one organization, 11.67 per cent had membership in more than one organization, 4.44 per cent of them were office bearers and rest 1.67 per cent of them were public leaders.

Mahalakshmi (2003) indicated that majority (41.67%) of the pulse growers had medium level of socio-politico participation followed by the rest with low (32.50%) and high (25.83%) levels of socio-politico participation.

Gopinath (2005) reported that more than half of the bengalgram growers (62.00%) had low level of socio-politico participation followed by the remaining with medium (23.33%) and high (14.67%) levels of socio-politico participation.

Acharya (2005) observed that 39.17 per cent of the jute farmers had low level of socio-politico participation followed by those having medium (31.66%) and high (29.17%) level of socio-politico participation.

Karpagam (2007) reported that the majority (77.50%) of the grape growers had low level of socio-politico participation followed by the rest having medium (20.00%) and high (2.50%) level of socio-politico participation.

Sivanarayana *et al.* (2008) concluded that majority (76.67%) of the cotton farmers were having no membership in any organization followed by (23.33%) farmers with membership in more than one organization respectively.

Gowda (2009) expressed that majority of sugarcane growers (53.33%) had medium level of socio-politico participation followed by those with low (35.00%) and the remaining11.67 per cent had high level of socio-politico participation.

Ganesh Kumar *et al.* (2013) stated that nearly two-third (64.44%) of the chickpea farmers had low level of social participation, followed by those with medium (24.45%) and high (11.11%) levels of social participation.

Ramalakshmi Devi *et al*. (2013) revealed that majority (67.50%) of the sugarcane farmers had medium social participation, followed by the rest with high (20.83%) and low (11.67%) levels of social participation.

Praveenbabu *et al*. (2016) stated that majority (62.50%) of paddy framers had medium level of social participation followed by low (20.80%) and high (16.70%) levels of social participation.

2.1.12 Mass Media Exposure

Mahalakshmi (2003) indicated that majority (41.67%) of the pulse growers had medium level of mass media exposure followed by high (33.33%) and low (25.00%) levels of mass media exposure.

Rahul (2003) inferred that a little more than two fifth of the papaya growers had medium (42.50%) mass media exposure, followed by those with low (36.67%) and high (20.83%) mass media exposure.

Kumar (2004) indicated that a little half of the coconut farmers had medium (52.67%) mass media exposure, followed by those having high (26.00%) and low (21.33%) mass media exposure.

Acharya (2005) indicated that a little less than two fifth of the jute growers had high mass media exposure (38.33%), followed by the remaining with low (33.34%) and medium (28.33%) mass media exposure

Ramya (2005) revealed that majority (54.44%) of the Curry leaf growers had medium level of mass media exposure followed by low (33.33%) and high (12.23%) levels of mass media exposure.

Balu Naik and Ramesh Babu (2010) found that more than one-third (38.33%) of the FFS farmers had medium mass media exposure, followed by the remaining with low (33.33%) and high (28.34%) levels of mass media exposure.

Nayak (2010) from his study revealed that less than two third of the ATMA respondents had medium (64.17%) mass media exposure, followed by those having low (24.16%) and high (11.67%).

Prabhugouda (2011) revealed that a little less than two third of the pomegranate growers had medium (64.17%) mass media exposure followed by the remaining with low (20.00%) and high (15.83%) exposure.

Nrusimha Kalyan *et al.* (2012) found that majority (53.33%) of the groundnut farmers had medium mass media exposure, followed by the remaining with low (27.5%) and high (19.17%) levels of mass media exposure.

Kiranmayi (2013) revealed that more than half of the chilli farmers had medium (68.34%) mass media exposure, followed by the remaining had high (18.33%) and low (13.33%) mass media exposure.

Ramalakshmi Devi *et al.* (2013) stated that majority (69.17%) of the sugarcane farmers were found medium in mass media exposure, followed by those with high (20.00%) and low (10.83%) levels of mass media exposure.

Praveenbabu *et al*. (2016) stated that majority (75.00%) of paddy farmers had medium mass media exposure followed by low (14.17%) and high (10.83%) levels of mass media exposure.

2.1.13. Market Orientation

Atchutaraju (1998) revealed that majority (57.50%) of the betelvine growers had medium market orientation, followed by the rest with high (22.50%) and low (20.00%) market orientation.

Palaniswamy and Sriram (2001) reported that most (84.36%) of the sugarcane growers had medium market orientation, followed by 10.88 per cent and 04.76 per cent with high and low market orientation, respectively.

Yogita (2004) observed that more than half of the banana growers belonged to medium (55.84%) market orientation, followed by low (34.16%) and high (10.00%) market orientation.

Tiwari *et al.* (2007) revealed that majority (58.53%) of the pea farmers had low level of market orientation, followed by those with medium (26.82%) and high (14.65%) levels of market orientation.

Lina Joy *et.al* (2008) in their research article on women led agro processing self groups reported that powder making units and ready to eat items making units exhibited high market perception, followed by fish processing and copra processing units, respectively.

Patil (2008) reported that a little less than three fifth of the grape farmers belonged to medium (59.00%) market orientation category, followed by those with high (34.00%) and low (7.00 %) market orientation categories.

Mehta and Madhuri (2012) reported that less than three-fourths (72.00%) of Mango growers belonged to the medium market orientation, followed by rest coming under high (16.00%) and low (12.00%) categories.

Sravan Kumar (2012) indicated that majority of vermicompost entrepreneurs had medium (73.33%) level of market orientation, whereas, 13.33 per cent and 11.67 per cent of the entrepreneurs belonged to low and high market orientation.

Kiranmayi (2013) reported that more than half of the chilli farmers had medium (58.33%) market orientation, followed by those with low (21.67%) and high (20.00%) market orientation.

Praveenbabu *et al*. (2016) stated that majority (66.66%) of paddy farmers had medium market orientation followed by high (17.6%) and low (15.8%) levels of market orientation.

2.1.14. Economic Orientation

Dhamodaran and Vasanthakumar (2001) stated that majority (70.83%) of the sugarcane growers had high level of economic orientation, followed by those with medium (29.17%) level.

Palaniswamy and Sriram (2001) observed that 75.51 per cent of the Sugarcane growers had medium economic orientation, followed by 17.01 per cent with low and 07.48 per cent with high categories of economic orientation.

Rajendra Kumar (2002) inferred that majority (52.50%) of the hybrid jowar growers had medium economic orientation, while 31.67 per cent and 15.83 per cent had low and high economic orientation respectively.

Mahalakshmi (2003) indicated that majority (44.17%) of the pulse growers had medium level of economic orientation, followed by those with high (30.83%) and low (25.00%) levels of economic orientation.

Sajithkumar (2004) inferred that 62.00 per cent of the coconut respondents had medium economic orientation followed by the rest with low (23.33%) and high (14.67%) economic orientation.

Acharya (2005) concluded that 45.00 per cent of the jute farmers had high economic orientation followed by those having medium (43.33%) and low (11.67%) level of economic orientation.

Gopinath (2005) observed that 67.33 per cent of the bengalgram farmers had medium economic orientation, followed by the remaining with low (19.33%) and high (13.34%) levels of economic orientation.

Ramya (2005) revealed that majority (40.00%) of the curry leaf growers had high level of economic orientation, followed by those with medium (33.33%) and low (26.67%) levels of economic orientation.

Gowda *et al.* (2011) indicated that majority (52.50%) of the sugarcane growers had medium economic orientation, followed by the rest with low (27.50%) and high (20.00%) levels of economic orientation.

Sravan Kumar (2012) revealed that two third (66.67%) of vermicompost entrepreneurs fell under medium economic orientation category followed by low (18.33%) and high (15.00%) economic orientation categories

Ganesh Kumar *et al.* (2013) revealed that more than half (51.11%) of the chickpea farmers had high level of economic orientation, followed by those with medium (25.22%) and low (23.67%) levels of economic orientation.

Praveenbabu *et al*. (2016) stated that majority (56.67%) of paddy farmers had medium economic orientation followed by high (24.16%) and low (19.17%) levels of economic orientation.

2.2 EXTENT OF KNOWLEDGE OF TURMERIC FARMERS ON SELECTED PRODUCTION TECHNOLOGY

Verma and Maraddi (2003*)* revealed that about 69 per cent of the respondents had medium level of knowledge. Only 17 per cent of respondent were possessing high knowledge level, whereas 14 per cent of respondents had low level of knowledge.

Sunil Kumar (2004) found that high per cent of tomato growers in Belgaum district of Karnataka had knowledge about the manual sorting (86.66%), manual grading (70.00%), bamboo basket packing (74.16%), whereas, knowledge about processing of tomato was noticed with 55.00 per cent of respondents.

Raghavendra (2005) conducted a study on knowledge and adoption of recommended cultivation practices of Cauliflower growers in Belgaum district of Karnataka and found that 61.66 per cent of the respondents possessed medium level of knowledge followed by 22.50 per cent and 15.84 per cent falling under low and high level of knowledge categories, respectively

Gopinath (2005) found that 58.00 per cent of the bengalgram respondents had medium knowledge about recommended package of practices followed by those with low (22.00%) and high (20.00%) levels of knowledge.

Gopiram (2005) revealed that majority of the turmeric farmers (60.87%) had medium knowledge about recommended practices followed by the rest with low (20.00%) and high (19.13%) knowledge level.

Maraddi *et al.* (2008) stated that more than half of the respondents (53.33%) belonged to medium knowledge level category, while 32.77 per cent had low knowledge and 14 per cent had high knowledge about selected Sustainable Cultivation Practices in Sugarcane (SCP).

Sidram (2008) found that majority of organic farmers of pegionpea (63.33%) belonged to the medium knowledge level category, while 23.33 per cent and 13.33 per cent of the respondents belonged to high and low knowledge level categories, respectively

Shakya *et al.* (2008) revealed that majority of the chickpea farmers had medium (80.00%) level of knowledge followed by those with high (18.33%) and low (1.67%) level of knowledge about chickpea production technology.

Patel *et al*. (2011) revealed that majority (64.17%) of the IPM trained cotton growers were having medium level of knowledge regarding IPM technology in cotton crop followed by 30.00 per cent and 5.83 per cent with high and low level of knowledge, respectively.

Sreenivasulu (2012) stated that majority (57.77%) of FFS farmers had medium knowledge level about Cotton ICM practices followed by 24.44 per cent in high and 17.77 per cent in low categories.

Ambedkar *et al*. (2013) revealed that 41.67 per cent of the bengalgram farmers had medium level of knowledge, followed by the rest with high (35.00%) and low (23.33%) levels of knowledge.

Manoj *et al.* (2013) reported that majority (57.50%) of the farmers of KVK adopted villages had medium level of knowledge followed by those with high (32.50%) and low (10.00%) level of knowledge.

Surat Singh and Sarju (2014) revealed that 63.5 per cent of the tomato growers had medium level of knowledge, followed by the rest with high (23.5 %) and low (13.0%) levels of knowledge.

Randhir Singh *et al*. (2014) indicated that 61.25 per cent farmers had medium, 20.62 per cent farmers had high and 18.13 per cent farmers had low level of knowledge of scientific wheat cultivation practices.

2.3 EXTENT OF ADOPTION OF TURMERIC FARMERS ON SELECTED PRODUCTION TECHNOLOGY

Pandya and Thumar (2000) revealed that more than two-third (69.05%) of the groundnut growers had medium adoption level, followed by low (15.70%) and high (15.24%) levels of adoption

Ranganath *et al.* (2001) concluded that almost half (49.00%) of organic farmers having higher adoption level, followed by rest with low (30.00%) and medium (21,00) levels of adoption.

Vinoth (2002) stated that a little more than two fifth of the coconut farmers belonged to low (43.33%) adoption categories, followed by rest with medium (31.67%) and high (25.00%) adoption category.

Singh and Singh (2002) found that half (50.00%) of the rapeseed farmers had medium level of adoption, followed by those with low (27.30%) and high (22.22%) levels of adoption.

Christain *et al.* (2003) revealed that a little less than two fifth of the cotton growers had low (37.50%) adoption behavior, followed by medium (36.67%) and high (25.83%) adoption behaviour.

Gopiram (2005) revealed that a little more than half of the turmeric farmers had medium (51.33%) degree of adoption, followed by high (25.34%) and low (23.33%) adoption degrees.

RoyBurman *et al.* (2006) revealed that majority of the pulse farmers had medium (55.62%) level of adoption followed by those with low (26.88%) and high (17.50%) level of adoption of improved production technology.

Rath *et al.* (2007) observed that a little more than two fifth of the rice respondents had medium (44.00%) rate of adoption, followed by the rest with high (36.00%) and low (20.00%) adoption.

Ganeshprasad *et al.* (2010) two third (65.83%) of turmeric farmers belonged to medium adoption category, whereas, 17.50 and 16.67 per cent of them belonged to high and low adoption categories respectively.

Singh *et al.* (2010b) revealed that two third of the vegetable growers had medium level of adoption (66.00%), followed by low (19.00%) and high (15.00%) level of adoption.

Sreekanthavarma *et al.* (2011) in their research article on extent of adoption of improved production technology by banana farmers reported that more than three fourth of respondents (75.83%) belonged to medium adoption category, Whereas 14.17 per cent respondents belonged to low adoption category followed by 10 per cent high adoption category.

Satyaprakash, *et al.* (2012) reported that average adoption level of turmeric growers were found highest 64.99 per cent and lowest 42.26 per cent of marginal turmeric growers. The adoption level of small and medium turmeric growers were 50.22 and 57.68 per cent, respectively.

Ovhar *et al.* (2013) revealed that two third of the farmers (56.67%) were included under medium category of adoption level of improved cultivation practices, followed by low level of adoption (22.22%) and (21.11 %) farmers were found in high level of adoption of improved cultivation practices of turmeric

Matouleibi Chanu *et al.* (2014) revealed that majority (65.33%) of the pineapple growers had medium level of adoption followed by high level of adoption (24.67%). Only 10.00 per cent of the respondents had low level of adoption.

Surat Singh and Sarju (2014) revealed that majority of (46 %) of tomato growers belonged to high adoption category, whereas, 37 and 15 per cent of them belonged to medium and low adoption categories, respectively.

Marak B. R *et al*. (2015) stated that majority (42 %) of pineapple growers had low level of adoption, followed by medium level of adoption (35%) and only 23 per cent respondents have high level of adoption.

Dhayal and Mehta (2015) revealed that majority (57.00) of greengram farmers were with medium level of adoption, and 29.00 per cent farmers were in the category of low adopters and 10.00 per cent of farmers were high adopters.

Nandkumar R., (2015) reveals that 55.5 per cent of indigenous knowledge of livestock farmers had medium adoption level followed by low (25 per cent) and high (19.5 per cent) categories of adopters.

Meshram *et al*.(2016) stated that majority of paddy growers has (43.33%) had low extent of adoption of recommended seed treatment followed by 40 per cent had medium and rest 16.67 per cent had high extent of adoption.

2.4. RELATIONSHIP OF PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF THE TURMERIC FARMERS WITH THEIR EXTENT OF KNOWLEDGE AND ADOPTION

Tab. 2.1 Profile characteristics Vs extent of knowledge

Association	Significant/ Non-significant	Reference	Year	Respondents
Age				
Positive	Significant	Srilatha and Vani	2006	Cotton farmers
Positive	Significant	Prakash and De	2008	Beekeeping farmers
Positive	Non-significant	Meena *et al.*	2009a	Dairy farmers
Positive	Non-significant	Naik *et al.*	2009	Organic farmers
Negative	Significant	Sharma *et al.*	2009	Dairy farmers
Positive	Non-significant	Saha *et al.*	2010	Livestock farmers
Positive	Non-significant	Mukesh *et al.*	2015	Cotton growers
Positive	Significant	Praveenbabu *et al.*	2015	Paddy farmers

Education				
Negative	Non-significant	Srilatha and Vani	2006	Cotton farmers
Positive	Significant	Prasad Reddy *et al.*	2007	Rice farmers
Positive	Significant	Prakash and De	2008	Beekeeping farmers
Positive	Significant	Shakya *et al.*	2008	Chickpea farmers
Positive	Non-significant	Naik *et al.*	2009	Organic farmers
Positive	Non-significant	Meena *et al.*	2009a	Dairy farmers
Positive	Significant	Sharma *et al.*	2009	Dairy farmers
Positive	Significant	Ambedkar	2010	Bengal gram farmers
Negative	Non-significant	Saha *et al.*	2010	Livestock farmers
Positive	Significant	Sravan Kumar	2012	Vermicompost entrepreneurs
Positive	Significant	Mukesh *et al.*	2015	Cotton growers
Positive	Significant	Praveenbabu *et al.*	2015	Paddy farmers
Land holding				
Positive	Significant	Janardhan	2004	Sugarcane growers
Positive	Significant	Gangil And Dabas	2005	Livestock farmers
Positive	Significant	Gopinath	2005	Bengal gram farmers
Positive	Significant	Prasad Reddy *et al.*	2007	Rice farmers
Positive	Non-significant	Prakash And De	2008	Beekeeping farmers
Positive	Non-significant	Naik *et al.*	2009	Organic farmers
Positive	Non-significant	Ambedkar	2010	Bengal gram farmers
Positive	Non-significant	Sravan Kumar	2012	Vermicompost entrepreneurs
Positive	Non-significant	Mukesh *et al.*	2015	Cotton growers

Farming experience				
Positive	Non-significant	Gayathri *et al.*	2002	Red gram growers
Negative	Non-significant	Rajendra Kumar	2002	Jowar growers
Positive	Significant	Janardhan	2004	Sugarcane growers
Positive	Significant	Prasad Reddy *et al.*	2007	Rice farmers
Positive	Significant	Ambedkar	2010	Bengal gram farmers
Positive	Significant	Praveenbabu *et al.*	2015	Paddy farmers
Family size				
Positive	Non-significant	Gangil and Dabas	2005	Livestock farmers
Negative	Non-significant	Srilatha and Vani	2006	Cotton farmers
Positive	Significant	Tripathi *et al.*	2006	Chickpea farmers
Positive	Non-significant	Prakash and De	2008	Beekeeping farmers
Positive	Non-significant	Meena *et al.*	2009a	Dairy farmers
Negative	Non-significant	Sravan Kumar	2012	Vermicompost entrepreneurs
Farm machinery				
Positive	Non-significant	Singh	1987	Tribal farmers
Negative	Non-significant	Zotawana	1987	Paddy farmers
Positive	Non-significant	Prasad	1990	Tribal farmers
Positive	Non-significant	Rao	1993	Tribal famers
Positive	Significant	Sankar Rao	1995	Tribal farmers

Annual income				
Positive	Significant	Kharde and Nimbalkar	1996	Sugarcane farmers
Positive	Significant	Deshmukh *et al.*	1997	Groundnut farmers
Positive	Significant	Hanumanaikar *et al.*	1997	Sunflower farmers
Positive	Significant	Meti *et al.*	1997	Groundnut farmers
Positive	Significant	Patil *et al.*	1999	Kagzilime farmers
Positive	Significant	Kalaskar *et al.*	1999	Cotton growers
Positive	Significant	Veeraiah *et al.*	2005	Cotton growers
positive	Non-significant	Shubhadeep Roy *et al.*	2007	Gladiolus growers
Positive	Significant	Mukunda Rao	2011	Bt cotton growers
Positive	Significant	Mukesh *et al.*	2015	Cotton growers
Extension contact				
Positive	Non-significant	Gayatri *et al.*	2002	Redgram growers
Positive	Non-significant	Rajendra Kumar	2002	Hybrid jowar growers
Positive	significant	Satpal Singh *et al.*	2003	Sunflower farmers
Positive	Significant	Sunil Arya *et al.*	2003	Sugarcane farmers
Positive	Significant	Janardhan	2004	Sugarcane growers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Significant	Ambedkar	2010	Bengalgram farmers
Positive	Significant	Mukesh *et al.*	2015	Cotton growers
Positive	Significant	Pravennbabu *et al.*	2015	Paddy farmers
Occupation				
Positive	Non-significant	Sukanta *et al.*	2013	Dairy farmers
positive	significant	Saidur and Jancy	2014	Dairy farmers
Positive	significant	Mukesh *et al.*	2015	Cotton growers

Innovativeness				
Positive	Non-significant	Balasubramani *et al.*	2005	Rubber growers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Significant	Rathood	2005	Sugarcane farmers
Positive	Significant	Prasad Reddy *et al.*	2007	Rice farmers
Positive	Significant	Naik *et al.*	2009	Organic farmers
Positive	Significant	Ambedkar	2010	Bengal gram farmers
Positive	Significant	Sravan Kumar	2012	Vermicompost entrepreneurs
Socio- participation				
Positive	Significant	Vennila *et al.*	2001	Millet growers
Positive	Non-significant	Gayatri *et al.*	2002	Redgram growers
Positive	Significant	Govinda Gowda *et al.*	2002	Dryland farmers
Positive	Significant	Rajendra Kumar	2002	Hybrid Jowar growers
Positive	Non-significant	Janardhan	2004	Sugarcane growers
Positive	Significant	Prasad Reddy *et al.*	2007	Rice farmers
Positive	Significant	Shakya *et al.*	2008	Chickpea growers
Positive	Significant	Ambedkar	2010	Bengalgram farmers
Positive	Significant	Praveenbabu *et al.*	2015	Paddy farmers
Mass media exposure				
Positive	Significant	Gayatri *et al.*	2002	Redgram farmers
Positive	Significant	Govinda Gowda *et al.*	2002	Groundnut farmers
Positive	Significant	Rajendra Kumar	2002	Hybrid jowar growers
Positive	Significant	Prasad	2002	Rice growers
Positive	Significant	Saptal Singh *et al.*	2003	Sunflower farmers
Positive	Significant	Sunil Arya *et al.*	2003	Sugarcane farmers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Significant	Shakya *et al.*	2008	Chickpea growers
Positive	Significant	Ambedkar	2010	Bengalgram farmers
Positive	Significant	Mukesh *et al.*	2015	Cotton growers
Positive	Significant	Praveenbabu *et al.*	2015	Paddy farmers

Market orientation				
Positive	Significant	Rajendra Kumar	2002	Hybrid jowar growers
Positive	Significant	Raju and Murthy	2002	Betelvine farmers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Non-significant	Ambedkar	2010	Bengalgram farmers
Positive	Significant	Sravan Kumar	2012	Vermicompost entrepreneurs
Positive	Significant	Praveenbabu *et al.*	2015	Paddy farmers
Economic orientation				
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Significant	Tripathi *et al.*	2006	Chickpea farmers
Positive	Significant	Prasad Reddy *et al.*	2007	Rice farmers
Positive	Significant	Roy *et al.*	2007	Gladiolus farmers
Positive	Significant	Shakya *et al.*	2008	Chickpea farmers
Positive	Significant	Naik *et al.*	2009	Organic farmers
Positive	Significant	Sharma *et al.*	2009	Dairy farmers
Positive	Significant	Ambedkar	2010	Bengalgram farmers
Positive	Significant	Rai and Singh	2010	Cotton farmers
Positive	Significant	Sravan Kumar	2012	Vermicompost entrepreneurs
Positive	Significant	Mukesh *et al.*	2015	Cotton farmers
positive	Significant	Praveenbabu *et al.*	2015	Paddy farmers

TABLE 2.2 Profile characteristics Vs extent of adoption

Association	Significant/ Non-significant	Reference	Year	Respondents
Age				
Negative	Non-Significant	Veerendranath	2000	Castor
Positive	Significant	Narkar *et al.*	2004	Kagzilime growers
Positive	Significant	Ghodichor *et al.*	2005	Paddy growers
Positive	Non-significant	Tiwari *et al.*	2007	Pea growers
Positive	Non-significant	Naik *et al.*	2009	Rice farmers
Negative	Non-significant	Dayaram *et al.*	2010	Wheat growers
Negative	Significant	Singh *et al.*	2010b	Vegetable growers
Positive	Non-significant	Singh *et al.*	2012	Livestock owners
Positive	Significant	Kiranmayi	2013	Chilli farmers
Positive	Significant	Sandeep *et al.*	2013	Sugarcane growers
positive	Non-Significant	Sujatha B *et al.*	2015	Sericulture farmers
Education				
Positive	Non-significant	Kanavi	2000	Sugarcane growers
Positive	Significant	Lakshminarayan *et al.*	2001	Sugarcane farmers
Positive	Significant	Hemanth	2002	Tobacco
Positive	Significant	Janardhan	2004	Sugarcane growers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Negative	Significant	Raj *et al.*	2006	Rice growers
Positive	Significant	Borah and Debajit	2007	Mustard farmers
Positive	Significant	Maraddi and Kumar	2008	Sugarcane farmers
Positive	Significant	Dayaram *et al.*	2010	Wheat growers
Positive	Non-significant	Singh *et al.*	2012	Livestock owners
Positive	Significant	Kiranmayi	2013	Chilli farmers
Positive	Significant	Sujatha B *et al.*	2015	Sericulture farmers

Land holding				
Negative	Non-siginficant	Sivanarayana	2000	Arecanut growers
Negative	Non-significant	Dhamodaran and Vasanthakumar	2001	Sugarcane farmers
Positive	Non-significant	Lakshminarayan *et al.*	2001	Sugarcane farmers
Positive	Non-significant	Rahul	2003	Papaya farmers
Positive	Non-significant	Janardhan	2004	Sugarcane growers
Positive	Significant	Gopiram	2005	Turmeric farmers
Positive	Significant	Raj *et al.*	2006	Rice growers
Positive	Significant	Borah and Debajit sut	2007	Mustard farmers
Positive	Non-significant	Maraddi and Kumar	2008	Sugarcane farmers
Positive	Significant	Ramesh and Santha	2008	Organic growes
Positive	Non-significant	Ambedkar	2010	Bengalgram growers
Positive	Significant	Singh *et al.*	2010b	Vegetable growers
Positive	Non-significant	Kiranmayi	2013	Chilli farmers
Farming experience				
Positive	Significant	Lakshminarayan *et al.*	2001	Sugarcane farmers
Positive	Significant	Sivasubramanian	2003	Coconut farmers
Positive	Significant	Janardhan	2004	Sugarcane growers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Non-significant	Gopiram	2005	Turmeric growers
Positive	Significant	Maraddi and Kumar	2008	Sugarcane farmers
Positive	Non-significant	Naik	2009	FFS farmers
Positive	Significant	Ambedkar	2010	Bengalgram growers
Positive	Non-significant	Nayak	2010	ATMA respondents
Positive	Non-significant	Kiranmayi	2013	Chilli farmers
Positive	Significant	Sujatha B *et al*	2015	Sericulture farmers

Family size				
Positive	Non-significant	Singh and Chauhan	2010	Mungbean farmers
Positive	Non-significant	Singh *et al.*	2010a	Potato growers
Positive	Non-significant	Singh *et al.*	2010b	vegetable growers
Positive	Significant	Mazumder *et al.*	2011	Vegetable growers
Positive	Non-significant	Singh *et al.*	2012	Livestock owners
Positive	Non-significant	Kiranmayi	2013	Chilli farmers
Negative	Non-significant	Sujatha B *et al*	2015	Sericulture farmers
Farm machinery				
Positive	Significant	Singh	1987	Tribal farmers
Positive	Non-significant	Zotawana	1987	Paddy farmers
Positive	Non-significant	Prasad	1990	Tribal farmers
Positive	Significant	Rao	1993	Tribal famers
Positive	Non-significant	Sankar Rao	1995	Tribal farmers
Positive	Non-significant	Archana	2012	Castor farmers
Annual income				
Positive	Significant	Savitha	2001	Organic farmers
Positive	Significant	Veeraiah *et al.*	2005	Cotton growers
Positive	Significant	Tiwari *et al.*	2007	Pea growers
negative	Significant	Umesh *et al.*	2008	Cotton growers
Positive	Significant	Bondarwad *et al.*	2010	Bt cotton growers
Positive	Significant	Singh *et al.*	2010b	Vegetable growers
Positive	Significant	Mukunda Rao	2011	Bt cotton growers
Positive	Non-significant	Singh *et al.*	2012	Livestock owners
Positive	Significant	Kiranmayi	2013	Chilli farmers
Positive	significant	Sandeep *et al.*	2013	Sugarcane growers

Extension contact				
Positive	Significant	Janardhan	2004	Sugarcane growers
Positive	Significant	Gopiram	2005	Turmeric growers
Positive	Significant	Raj *et al.*	2006	Hybrid rice growers
Positive	Non-significant	Tiwari *et al.*	2007	Pea growers
Positive	Significant	Maraddi and Kumar	2008	Sugarcane farmers
Positive	Non-significant	Naik	2009	FFS farmers
Positive	significant	Ambedkar	2010	Bengalgram farmers
Positive	non-significant	Singh *et al.*	2010b	Vegetable farmers
Positive	Significant	Sandeep *et al.*	2013	Sugarcane growers
Positive	Significant	Kiranmayi	2013	Chilli farmers
Positive	Significant	Sujatha B *et al.*	2015	Sericulture farmers
Occupation				
Positive	Significant	Zanu	2012	Pig farmers
Negative	Non-significant	Shehu	2013	Zinger farmers
Positive	Significant	Saidur and Jancy	2014	Dairy farmers
Innovativeness				
Positive	Significant	Rajendra Kumar	2002	Hybrid jowar growers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Significant	Rathood	2005	Sugaracane growers
Positive	Significant	Maraddi and Kumar	2008	Sugaracane farmers
Positive	Significant	Ambedkar	2010	Bengalgram farmers
Social participation				
Positive	Non-significant	Gayatri *et al.*	2002	Redgram farmers
Positive	Significant	Govinda Gowda *et al.*	2002	Dryland farmers
Positive	Significant	Rajendra Kumar	2002	Hybrid jowar growers
Positive	Significant	Singh *et al.*	2003	Chickpea growers
Positive	Non-significant	Janardhan	2004	Sugarcane growers
Positive	Non-significant	Gopinath	2005	Bengalgram farmers
Positive	Significant	Ambedkar	2010	Bengalgram farmers
Positive	Non-significant	Sujatha B *et al.*	2015	Sericulture farmers

Mass media exposure				
Positive	Significant	Lakshminarayan *et al.*	2001	Sugarcane farmers
Positive	Significant	Hemanth	2002	Tobacco growers
Positive	Significant	Singh *et al.*	2003	Chickpea farmers
Positive	Significant	Natarajan	2004	Upland rice growers
Positive	Significant	Gopiram	2005	Turmeric growers
Positive	Non-significant	Maraddi and Kumar	2008	Sugarcane farmers
Positive	Significant	Naik	2009	FFS farmers
Positive	Significant	Ambedkar	2010	Bengalgram farmers
Positive	Non-significant	Singh *et al.*	2010b	vegetable farmers
Positive	Significant	Kiranmayi	2013	Chilli farmers
Positive	Non-significant	Sujatha B *et al.*	2015	Sericulture farmers
Market orientation				
Positive	Significant	Rajendra Kumar	2002	Hybrid jowar growers
Positive	Significant	Ahire and Limbat	2002	Cotton growers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Significant	Tiwari *et al.*	2007	Pea growers
Positive	Significant	Ambedkar	2010	Bengalgram farmers
Positive	Non-significant	Sreekantha varma *et al.*	2011	Banana farmers
Positive	Significant	Kiranmayi	2013	Chilli farmers
Economic orientation				
Positive	Significant	Lakshminarayan *et al.*	2001	Sugarcane farmers
Positive	Significant	Gayatri *et al.*	2002	Redgram farmers
Positive	Significant	Govinda Gowda *et al.*	2002	Ground nut farmers
Positive	Significant	Rajendra Kumar	2002	Hybrid jowar growers
Positive	Significant	Raghavendra	2004	Redgram farmers
Positive	Significant	Gopinath	2005	Bengalgram farmers
Positive	Significant	Ambedkar	2010	Bengalgram farmers

2.5 CASELETS OF SUCCESSFUL TURMERIC GROWERS

Rosaiah and Rao (2004) reported that negative cash farm incomes of the household due to crop failures resulting from drought, non-availability or irregular water resources, crop management, non-remunerative prices, to borrow huge amounts at high interest rates had contributed to the economic unavailability and financial insolvency of marginal owner-cum-tenant households.

Mahitha (2005) identified the maladies that tend to suicidal deaths of cotton cultivators such as psychological, family maladies, crop production maladies like pest attack, spurious pesticides, dangers of mono-cropping, high rate of interest, lack of irrigation water etc. and suggested remedies like psychiatric counselling, provision of institutional credit, advance information incidence of pests and diseases and checking the quality of pesticides etc.

Swetha (2006) expressed in the vulnerable situation, the major maladies as perceived by prawn farmers were, physical like locating the prawn ponds near to seashore with under developed mangroves, not following scientific method of construction of prawn ponds; followed by economical like fluctuations in price of prawn due to disease attack and psychological like fearful, panicky, hopeless and depressed, followed by social, cultural and political as other vulnerabilities.

Here, a brief review of case study was presented in order to make the reader to comprehend the subject easily.

2.6 CONSTRAINTS FACED BY THE FARMERS AND SUGGESTIONS TO OVERCOME THE PROBLEMS

2.6.1 Constraints Faced by Farmers

Prasad (2002) reported that the problems faced by the paddy farmers in adoption of package of practices in the percentage rank order of their importance as non-availability of quality seed in time (78.00%) followed by non-availability of institutional credit facilities (69.50%), frequent power cuts (65.00%) and non-availability of inorganic fertilizers (55.00%) .

Gopiram (2005) reported the problems encountered by farmers in turmeric cultivation are: high cost of fertilizers and manures (62.00%), lack of knowledge about application of recommended doses of manures and fertilizers (55.00%), lack of technical guidance (44.00%), frequent fluctuation in market prices (42.00%) and non-availability of credit facilities (39.00%) in adoption of package of practices of turmeric farmers.

Naik (2006) in a study on groundnut cultivators reported the problems of farmers in groundnut cultivation in percentage rank order of their importance as non-availability of improved seed, pest & diseases, non availability of inputs in time, erratic rainfall, high cost of seed, lack of remunerative prices (78.00%), non availability of gypsum, less access to credit facilities (75.00%), insufficient extension activities, lack of training, lack of crop insurance, non availability of manures and organic fertilizers, more cost of labour at harvest (69.00%), and no value addition and processing units (55.00%) as the problems in groundnut cultivation.

Ramesh and Santha (2008) concluded that lack of marketing facilities and non availability of premium prices as the most important constraints for the adoption of organic farming.

Naik (2009) concluded the problems faced by FFS farmers were non availability of seeds at the time of sowing (81.16%), followed by failure of rodent management as mass approach (80.00%), seed treatment not adopted by all farmers (75.83%), unaware of different symptoms of pests and diseases (68.33%), lack of multiple resistant varieties (65.00%), low usage of green manures and FYM (55.00%), non-availability of neem seeds for NSKE preparation (50.00%) and lack of awareness about bio-fertilizers (48.33%).

Prabhugouda (2011) reported the problems faced by Pomogranate growers in percentage rank order of their importance as, bacterial blight (100.00%), difficult to identify disease free planting material (99.17%), lack of knowledge about value added products of Pomegranate (95.83%), high cost of plant protection chemicals (92.50%), non availability of labour for harvesting

(91.67%), high cost of chemical fertilizers (87.50%), lack of horticultural training programmes (62.50%), high rate of interest on credit (24.17%) and lack of grading facilities (68.33%).

Devi (2012) reported the problems faced by sugarcane farmers in adoption of package of practices as, high cost of labour for harvesting (90.83%), lack of remunerative price (87.50%), and poor irrigation facilities (80.83%) were the major problems expressed by the sugarcane farmers followed by severe incidence of pests and diseases (75.00%), delayed payments for the produce (73.33%), irregular supply of power (70.00%), non availability of improved planting material (65.00%), less credit facilities (52.50%), insufficient extension activities (50.00%), non availability of inputs in time (46.66%), lack of training (40.80%) , lack of crop insurance (34.17%), non availability of manures and organic fertilizers (30.88%), non availability of micronutrients (22.55%)& and Non availability of cost effective technologies (21.66%).

Kiranmayi (2013) stated the problems of tenant farmers in adoption of package of practices of chilli as follows, cent per cent of the tenant farmers perceived that land lease rents are hiked and more most of the land owners demand land leased rent before the commencement of the cropping season and lack of financial support from banks (I rank) as a problem in tenancy farming, while 93.33 per cent perceived that ‘it is difficult to pay the entire land lease rent in the form of cash’(II rank); and ‘money lenders are main source of credit lending money at high interest rates’ (II rank); 85.00 per cent perceived that ‘tenancy tenures are mostly short term’ (III rank); 80.00 per cent perceived that ‘developmental departments do not offer agricultural trainings for tenant farmers’ (IV rank), 73.33 per cent perceived that ‘input subsidy is not applicable for tenant farmers’ (V rank), 68.33 per cent perceived that ‘no fixed land lease rents’ (VI rank), 66.67 per cent perceived that ‘no vouchers are given for payment of lease rents for the land’ (VII rank), 60.00 per cent perceived that ‘lease contracts are verbal and no written agreements are made’ (VIII rank), 53.33 per cent perceived that ‘crop insurance is not applicable for tenant farmers’ (IX rank), and 43.33 per cent perceived that ‘weather insurance is not applicable for tenant farmers’ (X rank).

The above reviews indicated that the problems faced by farmers in farming were related to credit, inputs and market related.

2.6.2 Suggestions to overcome the Problems

Madhavilatha (2002) enlisted that suggestions given by the cotton respondents to overcome the constraints as, more awareness on advanced IPM practices, lowering the costs of inputs, developing methods for easy detection of the pests economic threshold levels, easy methods for biological control, regularization of labour costs and subsidies to reduce the costs of sprayers.

Reddy (2003) found that a little more than two third of tomato farmers suggested regulations to lower the cost of inputs (68.00%), followed by timely and adequate supply of inputs (60.67%), providing subsidies for critical inputs (56.67%), constant price support (54.67%), creation of the market facilities (50.00%), provision of credit facilities (47.33%), elimination of middlemen (39.33%), provision of storage facilities (26.67%), training to farmers & extension personnel (22.00%), creation of export facilities (19.33%) and proper weather forecasting (16.67%) as solutions for the farmers problems.

Raja (2004) in a study reported the suggestions to overcome the constraints in rice crop cultivation as, majority of the respondents perceived that provision of good quality seeds, provision of credit facilities and provision of fertilizers on subsidized rates (95.50%); followed by supplying effective plant protection chemicals, timely technical guidance (66.67%); and exact control measures of pests & diseases and release of drought tolerant varieties (54.54%).

Gopiram (2005) suggested in his study on turmeric farmers, that a little more than three fourth of the farmers perceived that supply of manures and fertilizers at standard rates, remunerative prices to the produce and timely technical guidance (78.00%); followed by conducting training programmes (75.00%); frequent visits by extension personnel (71.00%); removal of commission charges (69.00%), provision of credit facilities at lowest interest rates (64.00%) and provision of market information (61.00%) as solutions to overcome the barriers in farming.

Patil *et al.* (2006) reported the suggestions offered by participant farmers as: need for more technical information guidance by concerned departments (10.00%), financial assistance for maintenance of watershed (59.33%) and making the bank loan at lesser interest rate (25.34%).

Naik (2009) reported the suggestions given by the FFS farmers to overcome the problems in rice cultivation were; providing good quality of seed at subsidized rate (80.83%), followed by strengthening rodent management as mass approach (77.50%), wide publicity on seed treatment uses (65.00%), organized more field visits by extension personnel (62.50%), develop pest and disease resistant varieties (55.83%), more demonstrations organize on green manure and FYM (54.16%) and easy ways to solve pesticide doses (40.00%) in rank order of their magnitude.

Rai and Singh (2010) noticed the suggestions given by the cotton farmers to overcome the constraints as, proper value of return of cotton should be assured, electricity for irrigation should be provided in time, demonstration should be conducted at their field, technical suggestions should be given in time, technical suggestions should be given in time, proper credit facility should be provided, Inputs should be provided timely, Agriculture resources and equipments should be available at low cost, Improved cotton technology should be available in rural area and Special training on low cost input technology should be provided.

Devi (2012) enlisted the major suggestions of sugarcane farmers as, intervention and popularization of suitable and feasible sugarcane harvesters (93.33%), provision of remunerative price (91.67%), improving irrigation facilities (87.50%), followed by training on identification and control of pests and diseases and pest forecasting measures (83.33%), in time payments for the produce (80.83%), regular power supply (76.67%), provision of improved planting material in time (73.33%), provision of proper institutional finance and crop insurance (70.00%), extension activities and training (65.83%), timely and sufficient supply of inputs (56.67%) and development of cost effective technologies (41.67).

Kiranmayi (2013) stated the suggestions to solve the above listed problems of tenant farmers in chilli cultivation as, that cent per cent of the tenant farmers suggested that 'banks should extend crop loans for tenant farmers' (I rank), while 96.67 per cent perceived that 'tenancy contracts need to be monitored by the government' (II rank), 91.67 per cent perceived that 'tenancy tenures should be at least for 3 to 5years' (III rank), 88.33 per cent perceived that 'developmental departments should extend agricultural trainings for tenant farmers on regular, season and time specific basis' (IV rank), 81.67 per cent perceived that 'input subsidy should be extended for tenant farmers' (V rank), 76.67 per cent perceived that 'government should monitor the land lease rents (VI rank), 75.00 per cent perceived that 'all farmers should only go for written land lease agreements' (VII rank), 70.00 per cent perceived that 'receipts should be given on payment of land lease rents' (VIII rank), 68.33 per cent perceived that 'crop insurance should be extended for tenant farmers' (IX rank), and 66.67 per cent perceived that 'weather insurance should be extended for tenant farmers' (X rank).

From the above review it could be concluded that farmers could reap profits if banks give timely and sufficient financial support, developmental departments supply timely & sufficient quantities of inputs and government provide reasonable minimum support prices for the final product.

2.7 CONCEPTUAL MODEL OF THE STUDY

The conceptual framework is a diagrammatic representation outlining the dominant elements of a system and their relationship with respect to criterion variables.

The conceptual model in Figure contains three major divisions

1. Personal, socio-economic and psychological characteristics of the turmeric farmers.
2. Extent of knowledge of the farmers.
3. Extent of adoption by the farmers.

The personal, socio-economic and psychological characteristics of turmeric farmers are important since they affect the way in which extent of knowledge and adoption occurs for a given individual. Arrows indicate the relationships between personal, socio-economic and psychological characteristics and extent of knowledge and adoption

The extent of knowledge and adoption of farmers are considered as important dependent variables.

Chapter V

SUMMARY AND CONCLUSIONS

This chapter presents the summary of the findings, implications of the study and points for future research.

Turmeric (*Curcuma longa* L.) is a herbaceous perennial plant growing up to the height of 60-90 cm. with short stem and native of south Asia particularly India. It belongs to family Zingiberaceae. The plant was propagated through rhizomes. The leaves are long, broad lanceolate and bright green. The flowers were pale yellow and born on dense spikes. The pseudostem was shorter than leaves. The rhizomes were ready for harvesting about 7 to 9 months after plants

India was the largest producer, consumer and exporter of turmeric in the world. Indian turmeric was considered to be the best in the world market because of its high curcumin content. India accounts for about 80 per cent of world turmeric production and 60 per cent of world exports. Out of annual production 93 per cent is consumed within country and remaining 7 per cent is exported. Other major turmeric producers are Pakistan, China, Haiti, Jamaica, Peru, Taiwan and Thailand.

In Andhra Pradesh, Turmeric was mainly cultivated in the districts of Kadapa, Guntur, Krishna, East Godavari, and West Godavari. After bifurcation of Andhra Pradesh, the area under Turmeric was significantly reduced in newly formed Andhra Pradesh. In Telangana the normal area and production under Turmeric is 43,000 ha and 216,000 Tonnes, whereas in Andhra Pradesh it was only 17,000 ha and 1,51,000 Tonnes respectively. The above trend shows that there is a need to increase the area under Turmeric.

OBJECTIVES OF THE STUDY

General Objective

To study the extent of knowledge and adoption, constraints and suggestions faced by the turmeric farmers in the study area.

Specific Objectives

1. To study the personal, socio-economic and psychological characteristics of Turmeric Farmers.
2. To find out the extent of knowledge and adoption of farmers practices on Turmeric production technology.
3. To unearth the relationship between personal, socio-economic and psychological characteristics of Turmeric farmers with their knowledge and adoption level.
4. To present few case lets of successful Turmeric farmers.
5. To identify the constraints faced by the farmers in Turmeric cultivation and elicit their suggestions for improvement.

After the extensive review of literature, discussion with experts, the independent variables of turmeric farmers *viz.*, age, education, land holding, farming turmeric, family size, farm machinery status, annual income, extension contact, occupation, innovativeness, social participation, mass media exposure, market orientation and economic orientation were selected. The dependent variables were knowledge and adoption.

RESEARCH DESIGN

Ex-post facto research design was used in the present investigation.

SAMPLING PROCEDURE

The study was conducted in Andhra Pradesh state during the year 2015-16. Andhra Pradesh was one of the major turmeric growing States in India occupying first position in both area and production and the researcher belongs to this state and is familiar with the local language i.e. Telugu. Guntur district in Andhra Pradesh was purposively selected, since it stands second position in the area of the crop among all the districts in Andhra Pradesh state, during the year 2013-2014 and the district was having more number of medium, small, marginal turmeric cultivating farmers. Three mandals *viz.*, Kollipara, Duggirala, and Bhattiprolu were purposively selected as they have more area under turmeric cultivation in the district and Four villages from each selected mandal were selected based on maximum area of cultivation of turmeric crop thus making a total of 12 villages. The farmers were selected based on proportianate random sampling procedure, from 12 villages constituting the total sample of 120 respondents.

COLLECTION OF DATA

The primary data were taken from the respondents by personal interview with the help of pre-tested interview schedule covering all aspects of the investigation. To convert the data into meaningful findings, statistical tools such as; inclusive class interval method, Arithmetic Mean, Standard Deviation (σ), Frequency, Percentage, correlation (r) and Multiple Linear Regression (MLR) were used.

The summary of the findings were presented as follows;

SALIENT FEATURES OF THE STUDY

5.1 PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF THE TURMERIC FARMERS

Majority of the turmeric farmers were middle age (57.00%) had middle school education of 5^{th}-7^{th} class (35.00%), semi-medium land holding of 2.1-4.0 ha (31.67%), 18-29 years of farming experience (46.67%), medium family size of 4-6 members (61.67%), low farm machinery status (49.16%), medium annual income (52.50%), medium extension contact (58.33%), agriculture as occupation (63.30), medium innovativeness (59.16%), medium level of socio-politico participation (57.50%), medium mass media exposure (64.17%), medium market orientation (55.00%) and medium economic orientation (60.00%).

5.2 EXTENT OF KNOWLEDGE AND EXTENT OF ADOPTION OF TURMERIC FARMERS ON RECOMMENDED PRACTICES OF TURMERIC

5.2.1 Extent of Knowledge

Majority of the turmeric growers had medium level (59.17) of knowledge, followed by the rest with high (22.50%) and low (18.33%) level of knowledge.

The study revealed that 75 to 100 per cent of the farmers had knowledge about selected production technology of turmeric in the percentage rank order of their decreasing importance are, Long duration varieties of turmeric mature by 9 months (93.33%), fumes with typical odour was the characteristic symptom of completely boiled rhizomes gives (91.67%), The turmeric varieties Duggirala, salem and tekurpet mature by nine many months (90.83%), Main season of harvesting falls in march. (90.00%), and Decrease in yield was noticed when if sowing had done after second fortnight of July. (79.17%),

It was also revealed that 50 to 75 per cent of the farmers had knowledge about selected production technology of turmeric in the percentage rank order of their decreasing importance are : the optimum seed rate recommended for seed

rhizomes for one acre was 1000 kg per acre (67.50%), Within seven days the harvested rhizomes should be boiled (66.67%), Iron deficiency can be corrected by spraying ferrous sulphate and citric acid @ 5 gm + 1 gm/ lit (61.67%), Seed rhizomes are soaked in Ridomil @ 3 gms/lit, for the time period of 30 minutes (61.67%), Turmeric crop can be grown in heavy soils with 15-20 irrigations (59.17%), Crop rotation was compulsory practice in turmeric cultivation (59.17%), The optimum spacing turmeric of in ridges and furrows method is 45 × 20 (56.67%), The total germination process in Turmeric completes by 40 days (55.00%), Rhizome fly can be controlled by application of carbofuran granules (53.33%) and The optimum time period required for complete boiling of rhizomes is 30 minutes (52.50%). Best time for sowing of long duration varieties was first fortnight of June i (52.50%), Collar region of the pseudostem becomes soft resulting in collapse of the plant and decay of rhizomes was the symptom of rhizome rot (50.83%), Nitrogen fertilizerts should applied at the time of sowing, 40, 80 and 120 DAS (50.00%).

It is also revealed that 25 to 50 per cent of the farmers had knowledge about selected production technology of turmeric in the percentage rank order of their decreasing importance are: Turmeric leaf blotch can be controlled by spraying carbendizim @ 1ml /lit (48.33%), Brown spots of various sizes on the upper surface of the young leaves was a symptom of leaf spot (48.33%), The dosage of pendimethalin which has to be be sprayed for control of weeds/ acre is 1lit/acre (47.50%). Rhizome rot incidence was less when crop irrigated with drip system. (46.67%), In last ploughing the amount of FYM should be added was 10 tonnes (45.83%), The recommended dosage of MOP fertilizer in turmeric was 50 kg/acre(43.33%), The recommended dosage of Urea fertilizer is dosage for turmeric 150 kg/acre (39.17%), Afflotoxin attacks when boiled rhizomes are not properly boiled (38.33), The recommended dosage of SSP fertilizer in turmeric was 150 kg/acre (35.00%), When rhizome rot was observed in field, gap between two irrigations should be increase (32.50%) Rhizome fly infestation will cause dead heart, (30.83%). if drip system was used for irrigation the laterals spaced at 1 meter distance and emitters at 60 cm distance (27.50%), Zinc sulphate should be added to soil during land preparation, (22.50%), Placing of neem cake at collar region of plants can control the rhizome rot and Blotch (13.33%) and For export of the turmeric the curcumin content should be 4.5 (08.33%).

The plausible reason behind this might be due to majority of the farmers had semi-medium land holdings with middle school education, medium innovativeness, medium extension contact, medium mass media exposure, medium innovativeness, hence, the agricultural department and extension agencies should conduct training programmes and take the farmers to research stations and demonstration plots, progressive farmer's fields and inspiring them to have more extension contact, social participation and mass media exposure. So that these farmers will improve their knowledge about recommended package of practices.

5.2.2 Extent of Adoption

The study revealed that 62.50 per cent of turmeric farmers had medium extent of adoption, followed by high (20.83%) and low (16.67%) adoption levels with regard to adoption of turmeric production technology.

The study revealed that fully adopted the selected production technology by turmeric farmers in percentage rank order of their decreasing importance were; adoption of recommended seed rate (100%), Growing of turmeric in heavy soil. (100%), Harvesting stage: all leaves turns dry and falls on soil (100%), Boiling was stopped when forth comes out and white fumes appear (96.67%), Boiling the mother and finger rhizomes separately. (93.33%), Boiled rhizomes were dried for 10-15 days (90.83%), Sowing the turmeric rhizome before second fortnight of July (88.33), Weed free conditions should be maintained up to 120 DAS (87.50), Rhizomes for seed material should not store under direct sun light (86.67%), Sowing recommended varieties like duggirala, tekurpet amd selam (85.83%), Giving irrigation immediately after planting (80.83%), Method of sowing: Ridge and furrow (70.00%), Rhizomes should be boiled for time period of 45-60 minutes (65.00%), Depth of sowing: 5-7 cm (64.17%). Rhizomes were graded according to the size (61.67%), Spray Carbendazim@1 g/l + Propiconazole @1 ml/l two times in 15 days gap to control turmeric leaf spot (55.83%), Boiling of harvested rhizomes within 2-7 days (53.33%), Soil drenching with Ridomil MZ @2.5 g/lit to minimize the incidence of Rhizome rot (52.50%), Spraying Carbendazim @ 1 g/l to control Turmeric leaf blotch

(51.67), Dried rhizomes are polished to improve appearance, (48.33), At the time of sowing Neem cake @200kg /acre (31.67), Drip system was used for irrigation(23.33), Gunny bags used for storing rhizomes in godown are sprayed with Malathion @ 10 ml/l(6.67).

It also revealed the partially adopted the selected production technology by turmeric farmers in the percentage rank order of their decreasing importance were; In heavy soils 15-20 irrigation were given (62.50%), Deep summer ploughing for 6-8 times. (59.17%), application of Neem cake @200kg /acre at the time of sowing. (48.33%), Seed treatment with profenophos @2ml/lit and Carbofuran granules @ 10 kg/acre for control of Rhizome fly (38.33%), Seed treatment with malathoin @ 5ml/lit for 30 mins for control of Rhizome scales.(35.83%), Spraying Carbendazim @ 1 g/l to control Turmeric leaf blotch (35.00%), Soil drenching with Ridomil MZ @2.5 g/lit to minimize the incidence of Rhizome rot (27.50%), Dried rhizomes were polished to improve appearance. (25.83%), Spraying of Pendimethalin @ 1 lit in 200 litres of water next day after sowing. (20.00%), Giving irrigation immediately after planting (19.17%), Gunny bags used for storing rhizomes in godown were sprayed with Malathion @ 10 ml/l (19.17%), Boiling of harvested rhizomes within 2-7 days. (16.67%), Sowing recommended varieties like duggirala, tekurpet amd selam (14.17%), Sowing the turmeric rhizome before second fortnight of july (11.67%), Boiled rhizomes was dried for 10-15 days (09.17%) and Boiling was stopped when forth comes out and white fumes appear (3.33).

It, further, revealed that selected production technology which is not adopted by the turmeric farmers in the percentage order of their decreasing importance are; Use of steam boilers for boiling of turmeric produce (96.67%), Harvesting the rhizomes with the help of the harvesters (90.00%), Drip system was followed in irrigation (76.67%), Gunny bags used for storing rhizomes in godown are sprayed with Malathion @ 10 ml/l (74.17%), Spraying of Pendimethalin @ 1 lit in 200 litres of water next day after sowing. (57.50%), Cultivating rhizome fly restitant varieties like suguna and sudarshna. (52.50%), Seed treatment : Ridomil @ 3g/lit water (35.83%), Method of sowing: Ridge and furrow (30.00%), Dried rhizomes

were polished to improve appearance.(25.83%), Soil drenching with Ridomil MZ @2.5 g/lit to minimize the incidence of Rhizome rot (20.00%), Adding recommended fertilizers in the last plough FYM, Castor/Neem cake, $ZnSo_{4,}$SSP, MOP (17.50%) and Rhizomes are graded according to the size (10.83%)

The reasons for medium adoption might be due to medium knowledge, lack of awareness, lack of interest in knowing recommended package of practices of Turmeric, non-availability of materials in time, non-availability of labour at planting time, high cost of fertilizers, lack of knowledge on dosage of different pesticides and fungicides, high cost of machinery for small and marginal farmers, lack of remunerative price. Hence, authorities should orient their attention in imparting more training to farmers and arranging field trips to demonstration plots, inculcate the urge to achieve more and more yield from the field and raise their economic conditions to increase the extent of adoption of recommended practices to a high level from the present medium level.

5.3 RELATIONSHIP BETWEEN PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF THE TURMERIC FARMERS AND THEIR EXTENT OF KNOWLEDGE AND EXTENT OF ADOPTION

5.3.1 Relationship between Personal, Socio-economic and Psychological Characteristics and Extent of Knowledge

Out of fourteen selected independent variables eight of them such as age, education, farming experience, extension contact, innovativeness, social participation, mass media exposure and economic orientation were significantly related. The other variables such as land holding, family size, farm machinery status, annual income, occupation and market orientation did not show any significant relationship with level of knowledge on selected turmeric production technology

5.3.2 Multiple Linear Regression of Selected Independent Variables with Extent of Knowledge

The multiple linear regression analysis (MLR) indicated that all the fourteen independent variables put together explained 80.90 per cent of variance in the extent of knowledge of recommended practices; remaining 19.1 per cent due to the extraneous variable effect.

5.3.3 Relationship between Personal, Socio-Economic and Psychological Characteristics and Extent of Adoption

Out of fourteen independent variables nine variables *viz.,* age, education, experience in turmeric cultivation, farm machinery status, annual income, extension contact, innovativeness, mass media exposure, economic orientation, had shown significant relationship with the extent of adoption of recommended practices in turmeric. The remaining five variables like land holding, family size occupation, social participation and market orientation did not show any significant relationship with extent of adoption.

5.3.4 Multiple Linear Regression of Selected Independent Variables with Extent of Adoption

The multiple linear regression equation with fourteen selected independent variables put together contributed 86.50 per cent to the total variance in the extent of adoption; remaining 13.50 per cent due to the extraneous variable effect.

5.4 CONSTRAINTS FACED BY THE FARMERS IN TURMERIC CULTIVATION AND ELICIT THEIR SUGGESTIONS FOR IMPROVEMENT

5.4.1 Constraints in Adoption of Recommended Practices as Perceived by Farmers

The most important constraints encountered by the farmers in turmeric cultivation were; High cost of seed rhizomes, Inadequate availability of manures and fertilizers, followed by High cost of manures and fertilizers, Lack of

knowledge on dosage of different pesticides and fungicides, High cost of machinery for small and marginal farmers, exploitation by the middle men Fluctuations in market price, high wages of labour, non-availability of labour in time and non-availability of advanced steam boilers.

5.4.2 Suggestions Given by Farmers for Better Adoption of Recommended Practices

Suggestions given by the farmers to overcome the constraints in turmeric, Evolving suitable varieties with rhizome rot resistance, Demonstration on seed treatment technique, Making timely availability of quality seed material, Provision of advanced turmeric processing machinery on subsidy, timely provision of fertilizers subsidized rates, Supplying steam boilers on subsidy basis, Timely provision of credit facility at lower interest, Elimination of middlemen from the turmeric market system, Establishment of turmeric research station nearby, Timely technical guidance to the farmers on the advanced technology, Farmers rallies, exhibition on turmeric crop should be organised *etc.*

5.5 IMPLICATIONS OF THE STUDY

The implications of the study brought out several practical implications mostly in the nature of suggesting change in manipulation of variables. So as to contribute to effective transfer of turmeric production technology to increase the crop yields.

1. Extent of knowledge with respect to package of practices of turmeric was found at medium level. Hence, there is a need to increase knowledge levels of turmeric cultivators by conducting suitable training programmes, demonstrations and organizing regular field visits by extension officers to farmer's fields.

2. The present study revealed that majority of the farmers had medium level of adoption of recommended package of practices. Most of the farmers were not practicing the recommendations of turmeric. Hence, these practices call for additional knowledge and skills. Therefore, the efforts

should be made to provide the required knowledge and skills through training programmes and demonstrations. Besides, mass contact methods could be used for wider community adoption. Hence, there is a need on the part of extension personnel to educate and convince the farmers to adopt all the recommended practices by way of conducting demonstrations, field trips, training programmes and exhibitions *etc*.

3. It was observed from the study that majority of the respondents had middle followed by young and old age. In order to attract youth into farming, the agriculture should be transformed as a profitable enterprise by the government.

4. Majority of the respondents had high school level of education. Education is vital for development. One of the key role of respondents was dissemination of advanced technical knowhow to the fellow respondents in the villages. The job can effectively be performed by people with higher education. So the educational levels of present respondents can be increased by organising the non-formal educational programmes in the villages.

5. The government should provide farm machinery equipment to the farmers through co operatives for the community usage.

6. Medium level of extension contact was observed among the turmeric farmers. This trend should be changed by extension agents by making regular visits and have to develop good rapport with farmers.

7. Majority of the turmeric farmers had medium mass media exposure. Farmers should develop the habit of utilization of mass media, and gain latest recent technical knowledge through mass media.

8. Majority of the turmeric farmers had medium level of innovativeness. Innovativeness of farmers may be enhanced by taking them to research stations and demonstration plots frequently and provide the opportunity for interaction with scientists.

9. Most of the turmeric farmers had medium level of economic orientation, which should be built up by teaching better utilization of inputs and use of low-cost technologies.

10. Majority of the turmeric farmers had medium level of market orientation. This trend should be increased by providing latest market information and market intelligence to the farmers, to build up market orientation of the respondents.

11. Findings high lightened many constraints encountered by farmers in adoption of recommended practices of turmeric were; Non-availability of labour at planting time, High cost of fertilizers, Lack of knowledge on dosage of different pesticides and fungicides, High cost of machinery for small and marginal farmers, Low remunerative price. So, extension officers should arrange demonstrations for imparting techniques, skills of practices to the farmers for adoption of technology.

For increasing adoption, suggestions had been given by the turmeric farmers as order of their importance in turmeric cultivation were; Provision of early cash payment with minimum support price to turmeric, timely provision of credit facility, organisation of training programmes on various new farming methods of turmeric, timely provision of electricity supply, timely provision of fertilizers and seeds on subsidized rates, Timely extension contact is needed, Installation of bore wells on subsidized rates, Implementation of crop insurance scheme, Provision of good transportation facilities, Provision of harvesting equipments, Provision of loan at lower interest, Timely technical guidance and Provision of effective plant protection chemicals should be regarded as these would have desirable effect on them.

5.6 SUGGESTIONS FOR FUTURE RESEARCH

The findings of the present study warrant the need for further investigations in several directions, the following suggestions were made for use by further researchers who undertake studies in this area.

1. The present investigation was conducted in Guntur district. Similar studies may be undertaken in other districts.

2. The present study confined to twelve villages from three mandals only. Similar studies may be taken with more mandals and respondents.

3. The present study was confined to only one major commercial crop namely turmeric for assessing the level of knowledge and extent of adoption of farmers. Further, studies may be taken up on other important commercial crops.

4. The present study had considered only few selected personal, socio-economic and psychological characteristics in order to find out their relationship with dependent variables. A number of other variables which are likely to affect the dependent variables may be studied.

5. Ex-post facto research design was used in the present study in order to understand the level of knowledge and extent of adoption of farmers. This approach could be tested by experimental studies in order to know the exact impact of such studies in detailed.

6. Indigenous technologies being followed in turmeric cultivation can be documented and their scientific rationality may be analysed.