CHAPTER II
REVIEW OF LITERATURE

The main purpose of this chapter is to present some of the recent research studies which are related to the present investigation. There are very few studies so far conducted and reported in India on this aspect, however attempts has been made to collect related research findings and are presented in the light of the objectives under the following heads.

2.1 The personal, socio-economical, communicational, psychological characteristics of cotton growers
2.2 Knowledge level of cotton growers about Integrated Pest Management
2.3 Attitude of cotton growers towards Integrated Pest Management
2.4 Association between the selected characteristics of cotton growers and their knowledge about Integrated Pest Management
2.5 Association between the selected characteristics cotton growers and their attitude towards Integrated Pest Management
2.6 Constraints faced by the cotton growers in adoption of Integrated Pest Management
2.7 Suggestions by the cotton growers to overcome constraints faced by them in adoption of Integrated Pest Management

2.1 THE PERSONAL, SOCIO-ECONOMICAL, COMMUNICATIONAL, PSYCHOLOGICAL CHARACTERISTICS OF COTTON GROWERS

2.1.1 PERSONAL CHARACTERISTICS

2.1.1.1 Age

Chavda (2005) concluded that 65.34 per cent of Bt. cotton growers belonged to middle age group. Whereas 32.00 and 2.66 per cent of the Bt. cotton growers belonged to young and old age groups, respectively.

Patel (2006) concluded that 48.80 per cent of the pigeon pea growers belonged to middle age group, followed by 27.20 and 24.00 per cent of them had old and young age group, respectively.
Barvaliya (2007) found that majority of the farmers were middle and young age group *i.e.* 59.17 per cent and 22.50 per cent and 18.33 per cent farmers belonged to old age group.

Kamani (2007) revealed that 70.00 per cent of the organic farmers were found in middle age group, while 20.72 per cent were in young age group and 9.28 per cent farmers were found in old age group.

Kumbhani (2009) reported that 45.63 per cent coriander growers belonged to middle age group. Whereas 20.00 per cent and 34.37 per cent of the respondents were in old and young age group, respectively.

Gohil (2010) observed that about 46.00 per cent of the cotton crop growers belonged to middle age group followed by old (37.50 per cent) and young age (16.50 per cent) groups.

Khodifad (2010) revealed that 61.88 per cent of the respondents were in the middle age group followed by old age group (21.87 per cent) and young age group (16.25 per cent).

Borkhani *et al.* (2011) found that 26.50 per cent of respondents were between the age of 41 and 50 years.

Patel (2011) reported that majority of the respondent farmers (63.33 per cent) were found in middle age group where as equal number (18.34 per cent) were found young and old age group, respectively.

Shinde (2011) revealed that 51.67 per cent of the cotton growers were found in the middle age group followed by 30.83 per cent in old age group and rest 17.50 per cent of cotton growers in young age group.

Gorfad (2012) revealed that 65.00 per cent of respondents belonged to middle age group followed by 21.11 and 13.89 percent in old and young age groups, respectively.

Mavani (2012) revealed that 43.33 per cent of the groundnut growers were in middle age group. Whereas 32.50 and 24.16 per cent of them were in young and old age group, respectively.
Dhenge (2013) revealed that higher per cent of the respondents (43.33 per cent) were in the middle age group of 36 to 50 years. Nearly one third (30.83 per cent) young age group i.e. up to 35 years. Whereas one fourth (25.84 per cent) respondents were in the old age group of above 50 years.

Hadiya (2013) indicated that majority of the respondents 58.33 per cent were in the middle age group followed by 25.00 and 16.67 per cent of the respondents belonged to the old and young age group, respectively.

Tala (2013) reported that majority of the respondents (67.33 per cent) were found in middle age group, followed by 17.33 and 15.33 per cent belonged to old and young age groups respectively.

Vasava (2013) revealed that 60.00 per cent of the hybrid rice growers were in the middle age group, followed by 20.00 per cent were in young age group and 20.00 per cent were in old age group.

Salman (2014) indicated that 53.34 per cent of the cotton growers belonged to middle age group, followed by old age (33.33 per cent) and young age (13.33 per cent) groups, respectively.

Dhayal and Mehta (2015) revealed that majority of farmers belonging to middle age group i.e. between 30-54 years of age. This age group constitutes 61.00 per cent of the total sample. Further, farmers 21.00 per cent were from young and 18.00 per cent of old age group.

Patel (2016) studied that 53.33 per cent of the cotton growers with drip irrigation system belonged to middle age group. Whereas 42.78 per cent of the cotton growers with drip irrigation system belonged to old age group and only 3.89 per cent cotton growers with drip irrigation system belonged to young age group.

Dobariya et al. (2017) pointed out that 62.00 per cent of beneficiary and 52.00 per cent of non beneficiary farmers belonged to middle age group followed by 25.00 and 13.00 percent beneficiary farmers and 41.00 and 7.00 per cent non beneficiary farmers belonged to old age and young age group, respectively.
Kumbhani et al. (2017) indicated that majority of the respondents (65.00 per cent) were in middle age group followed by 20.00 per cent respondents belonging old age group and 15.00 per cent were under young age group.

Muhammad et al. (2017) revealed that 44.20 per cent of the respondents were young (under 35 years), while 41.70 per cent of the respondents were between 36-50 years (middle aged). Only 14.20 per cent of the respondents were over 50 years.

### 2.1.1.2 Education

Chavda (2005) concluded that 42.00 per cent of Bt. cotton growers had primary education. Whereas 30.67 per cent had secondary level of education, 14.67 per cent had higher secondary education 8.66 per cent were illiterate and only 4.00 per cent had college level education.

Patel (2006) revealed that 38.00 per cent of the pigeon pea growers were educated up to higher secondary level, followed by 28.40 per cent, 20.40 per cent and 10.80 per cent of them had educated up to secondary level, completed college level and up to primary level, respectively. While only 2.40 per cent were illiterate.

Chavda (2007) revealed that 71.00 per cent of groundnut growers had medium level of education followed by 17.00 per cent of respondents had low and 12.00 per cent had high education, respectively.

Kamani (2007) revealed that 30.00 per cent of organic farmers were graduate followed by 28.57 per cent had secondary level education, 15.72 per cent had post graduate level education and 25.71 per cent had low level of secondary education. It is interesting to note that not a single organic farmer was illiterate.

Bhosale (2010) indicated that 36.67 per cent of the rural youth had education up to secondary level followed by college and above level 28.65 per cent, higher secondary level 25.83 per cent and primary level education 9.17 per cent.

Gohil (2010) revealed that 32.50 per cent of the respondents were educated up to secondary level, while 27.00 per cent and 26.00 per cent respondents belonged to higher education and primary education level groups, respectively. Only 14.50 per cent of the respondents were illiterate.
Khodifad (2010) indicated that 52.50 per cent of groundnut growers had secondary level education, followed by 27.50 per cent of them were educated up to primary level only few respondents (8.13 per cent) had education beyond the secondary level. Whereas 11.87 per cent of total respondents were illiterate.

Tilara (2010) reported that 52.50 per cent of the Bt. cotton growers had secondary to higher secondary level of education.

Patel (2011) reported that 35.83 per cent of the cotton growers had secondary and 33.33 per cent of them had higher secondary level of education. Whereas 18.34 per cent and 12.50 per cent were educated up to primary level and above higher secondary level of education, respectively.

Shinde (2011) revealed that 40.83 per cent of the cotton growers were having secondary level of education followed by 21.67 per cent, 18.33 per cent and 14.17 per cent of them had higher secondary, primary and college level of education, respectively. Only 5.00 per cent were illiterate.

Gorfad (2012) revealed that 7.78 per cent of the groundnut growers were illiterate (unable to read or write). Whereas 11.67 per cent of them could read only and 18.89 per cent were functionally literate i.e. only read and write. About one fourth (26.67 per cent) of respondents were educated up to primary level followed by secondary school level (20.56 per cent) and higher secondary level (10.56) per cent, respectively. While only 3.89 per cent of them educated up to graduate and above college level of education.

Humbal (2012) indicated that 55.00 per cent of the respondents were educated up to primary level. Whereas 23.33 per cent of the respondents were illiterate, 15.83 per cent of the respondents were educated up to secondary level and only 5.83 per cent of the respondents were educated up to higher secondary level.

Dhenge (2013) revealed that 46.12 per cent of the farmers had secondary level of education and 22.22 per cent farmers had education up to primary level and college level. Among these 7.22 per cent farmers were educated up to higher secondary level.

Hadiya (2013) indicated that 44.17 per cent of the respondents were educated up to primary level. Whereas 35.84 per cent of the respondents were educated up to
secondary level, 11.00 per cent of the respondents were illiterate, 7.00 per cent of the respondents were educated up to higher secondary level and only 5.00 per cent of the respondents were educated up to graduate level.

Roy et al. (2013) indicated that majority of the farmers (63.33 per cent) were having medium level of education.

Tala (2013) observed that 60.00 per cent of the respondents were educated up to high school level, followed by 16.00, 13.33 and 6.00 per cent of the respondents had above graduation, primary school and middle school level of education, respectively.

Vasava (2013) observed that 46.00 per cent of the hybrid rice growers had primary level of education, followed by 44.00 per cent of them belonged to secondary level of education, and only 10.00 per cent of them had college and above level of education.

Dhayal and Mehta (2015) revealed that 63.00 per cent of the total farmers were educated upto secondary, 23.00 per cent were illiterate (no schooling) and 14.00 per cent were observed above secondary level of education in study area.

Patel (2016) revealed that 2.22 per cent farmers were illiterate. On the other hand, 46.12 per cent of the farmers had secondary level of education and 22.22 per cent farmers had education up to primary level and college level. Among them, 7.22 per cent farmers were educated up to higher secondary level.

Dobariya et al. (2017) pointed out that majority 50.00 per cent of beneficiary farmers and 42.00 per cent non-beneficiary farmers had educated up to primary level, followed by 44.00 per cent beneficiary farmers and 45.00 per cent non-beneficiary farmers had secondary and higher secondary level of education. Among them 3.00 and 3.00 per cent beneficiary farmers were illiterate and up to college level education. Whereas 8.00 and 5.00 per cent non-beneficiary farmers were illiterate and up to college level education.

Kumbhani et al. (2017) concluded that majority of the respondents (59.00 per cent) were educated up to primary level followed by 20.00, 15.00, 5.00 and 1.00 had up to illiterate, up to middle level and up to college and above level education, respectively.
Muhammad *et al.* (2017) revealed that most of the people living in the research area (80.80 per cent) were educated, only 19.20 per cent respondents were uneducated. Amongst educated respondents, 57.50 per cent had primary to secondary education followed by primary education about (15.00 per cent).

### 2.1.1.3 Farm experience

Jadav (2005) observed that 56.00 per cent of the mango orchard growers had medium experience as mango growers. Whereas 17.00 and 7.00 per cent of them had high and low experience as a mango grower, respectively.

Patel (2005) found that 19.00 per cent of respondents worked independently in managing their farm, Whereas 81.00 per cent worked under supervision of senior member of family.

Gullapelly (2006) concluded that majority of respondents (86.10 per cent) were worked independently in managing their farms and only 13.90 per cent worked as informal apprentice in the family farm under the supervision of senior member of the family.

Parmar (2006) concluded that majority of the paddy growers (85.00 per cent) had medium level of experience in cultivation of paddy crop.

Desale (2009) concluded that majority (62.50 per cent) of the castor growers had medium level of farming experience. Whereas 25.00 per cent and 12.50 per cent of them had high and low level of experience, respectively.

Rathod (2009) concluded that 47.50 per cent of the chilli growers were found with high level of experience, followed by 35.00 per cent and 17.50 per cent had medium and low level of experience in chilli cultivation, respectively.

Sangeetha *et al.* (2009) concluded that majority of the cotton farmers had medium farm experience (35.00 per cent).

Bhosale (2010) found that 64.18 per cent of the paddy growers had medium level of experience in cultivation of paddy crop. While 19.16 per cent and 16.66 per cent of them had high and low level of experience, respectively.
Gohil (2010) revealed that 65.00 per cent of the respondents had medium farm experience. Whereas 19.00 and 16.00 per cent of the respondents had low and high farm experience, respectively.

Shinde (2011) revealed that 56.37 per cent of the cotton growers had medium experience in cotton cultivation. Whereas 25.00 per cent and 18.33 per cent of them had high and low experience in cotton cultivation, respectively.

Badhe (2012) reported that majority of the farmers (56.00 per cent) had medium level of experience in farming, while 32.00 and 12.00 per cent of them had high and low level of experience in farming, respectively.

Dobariya et al. (2017) pointed out that majority of beneficiaries 70.00 per cent and 79.00 per cent non beneficiary farmers had 10 years of experience in farming.

2.1.1.3 Training received

Patel (2002) found that 46.67 per cent of the hybrid cotton growers had received training about Integrated Pest Management practices.

Parmar (2005) opined that 40.00 per cent of the respondents had received training while remaining of them did not receive any training.

Patel (2005) observed that 86.00 per cent of the chilli growers were untrained and rest of them (14.00 per cent) were found trained.

Shinde (2011) revealed that about 44.16 per cent cotton growers were received only one training. Whereas 31.67 per cent, 14.17 per cent and 10.00 per cent have taken two, three and more than three training, respectively.

Patel et al. (2017) concluded that majority of the respondents (77.00 per cent) had received 2 to 4 days training followed by (17.00 and 7.00 per cent) 1 day and 5 days and above, respectively.
2.1.2 SOCIO-ECONOMICAL CHARACTERISTICS

2.1.2.1 Size of family

Toppo (2005) revealed that 71.67 per cent of the respondents had large size of family *i.e.* above four members and 28.33 per cent of the respondents had small size of family (upto 4 members).

Zala (2008) revealed that majority of the respondents (61.25 per cent) had 5 to 8 members in their family, while 23.75 per cent of them had above 8 members in their family and only 15.00 per cent had up to 4 members in their family.

Deshmukh *et al.* (2009) revealed that 45.83 per cent of the youths were from family with medium size followed by 26.67 per cent and 24.17 per cent of them who were from the families with big and small size, respectively.

Rathod (2009) observed that 63.33 per cent of the chilli growers belonged to big size of family.

Bhosale (2010) found that majority of the rural youth (71.67 per cent) had large size family and rest 28.33 per cent of the rural youth belonged to families with small and medium size.

Tilara (2010) reported that majority of the Bt. cotton growers (76.67 per cent) were having medium to big size of family.

Cavane (2011) observed that majority of the respondents (65.20 per cent) had less than 8 members in their family.

Shinde (2011) revealed that 60.00 per cent of cotton growers were having more than 4 members in their family and rest 40.00 per cent of cotton growers had up to 4 members in their family.

Dobariya *et al.* (2017) pointed out that 43.00 and 52.00 per cent of the beneficiary and non beneficiary farmers had medium size of family, respectively.

2.1.2.3 Annual income

Joshi (2004) reported that 44.54 per cent of the respondents had high annual income (above Rs. 60,000/-), while 31.82 per cent and 23.64 per cent of the
respondents who had low income (up to Rs. 30,000/-) and medium income (Rs. 30,000/- to Rs. 60,000/-), respectively.

Sahoo (2004) found that 83.34 per cent of the respondents had high annual income of (above Rs. 30,000). While 8.33 per cent and 8.33 per cent of the respondents had medium income (Rs. 20,000 to 30,000) and low income (Rs. 20,000), respectively.

Chavada (2005) reported that 50.00 per cent of the respondents had medium annual income (Rs. 15,000 to Rs. 25,000). While 26.67 and 23.33 per cent of them had lower and high annual income, respectively.

Kumbhani (2009) indicated that 60.00 per cent of the respondents had medium income (Rs. 40,000 to Rs. 80,000). Whereas 16.88 per cent of the respondents were from high income group (more than Rs. 80,000) and 23.12 per cent of the respondents had income is below Rs. 40,000.

Dalsaniya (2010) indicated that 62.50 per cent of the respondents had medium income about (Rs. 40,000 to Rs. 80,000). Whereas 12.50 per cent of the respondents were from high income group (more than Rs. 80,000) and 25.00 per cent of the respondents had low income of (below Rs. 40,000).

Koli (2012) indicated that 52.78 per cent of the coconut growers were found with medium annual income followed by 33.33 and 13.89 per cent of them with high and low annual income, respectively. Thus it can be concluded that majority (86.11 per cent) of coconut growers were found with medium to high level of annual income.

Raut et al. (2012) revealed that 44.03 per cent of the cotton growers had annual income in between Rs. 50,001 to Rs. 75,000.

Shinde (2011) revealed that 50.84 per cent of the respondents had medium annual income ranging from Rs. 50,001 to Rs. 100000. Whereas 26.66 per cent of them were having high annual income (above Rs. 1 lakh) and 22.50 per cent of the respondents had low annual income (up to Rs. 50,000).

Mavani (2012) showed that 61.67 per cent of the respondents had medium income (Rs. 40,000 to Rs. 80,000) followed by 25.83 per cent of the respondents were
from high income group and 12.50 per cent of the respondents had low income of (below Rs. 40,000).

Singh and Pandya (2012) revealed that in regards to net income, maximum net income of Rs. 73430/ha obtained from maize-potato-summer groundnut and one graded buffalo then the other combination.

Dhenge (2013) reported that relatively higher proportion of respondents (41.66 per cent) were having annual income in between Rs. 25001 to Rs. 50000, followed by (36.67 per cent) of respondents were having annual income above Rs. 50000. Only (21.67 per cent) of the respondents were having annual income up to Rs. 25000.

Hadiya (2013) indicated that 46.67 per cent of the respondents had medium income (Rs. 40,000 to Rs. 80,000). About 33.33 per cent of the respondents were from low income group (below Rs. 40,000). Whereas 20.00 per cent of the respondents were from high income group (Above Rs. 80,000).

Tala (2013) pointed out that 44.00 per cent of the farmers had in between Rs. 50,001 to Rs. 1,00,000 as their annual income, followed by 37.33, 12.66 and 6.00 per cent of the respondents had up to Rs. 50,000, Rs. 1,00,001 to Rs. 1,50,000 and Rs. 1,50,000 to Rs. 2,00,000 level of annual income, respectively.

Vasava (2013) indicated that 62.00 per cent of the hybrid rice growers had annual income below Rs 50,000 followed by 33.00 and 5.00 per cent had Rs. 50,001 to Rs. 1,00,000 and above Rs. 1,00,001, respectively.

Dhayal and Mehta (2015) concluded that majority of the farmers i.e., 88.00 per cent were from above Rs. 24,000 per annum, while only 12.00 per cent farmers were found to be below Rs. 24,000 per annum.

Markana (2015) observed that 50.00 per cent of the respondents had medium income (Rs. 40,000 to Rs. 80,000), followed by 30.00 per cent of the respondents were from low income group (below Rs. 40,000) and 20.00 per cent of the respondents from high income group (above Rs. 80,000).

Sangada (2015) revealed that 43.33 per cent of the respondents had medium income (Rs. 50,000 to Rs. 1,00,000). About one fourth (25.33 per cent) of the
respondents were from low income group (below Rs. 50,000). Whereas 30.83 per cent of the respondents were from high income group (above Rs 10,000).

Patel (2016) pointed out that 59.45 per cent of the cotton growers with DIS had annual income between Rs. 1,50,001 to Rs. 2,50,000 followed by 16.11 per cent cotton growers of DIS were having annual income between up to Rs. 1,00,000. While, nearly one forth (24.44 per cent) of cotton growers of DIS belonged to annual income above Rs. 2, 50,001/-.  

Kumbhani et al. (2017) concluded that majority of the respondents (65.00 per cent) had annual income up to Rs. 50,000. Whereas 20.00 per cent of the respondents had annual income between Rs. 50,000 to 1,00,000, respectively.

2.1.2.4 Land holding

Christian (2001) stated that 85.00 per cent of the cotton growers had above 2.00 hectares of land holding, followed by 13.33 per cent and 1.67 per cent of them had 1.01 to 2.00 hectares and up to 1.00 hectares of land holding, respectively.

Sahoo (2004) observed that 33.34 per cent of the groundnut growers had more than 2 ha of land. Whereas 20.00 per cent of the respondents had less than 1 hectares land and 46.66 per cent more than 4 hectares of land, respectively.

Bharad (2007) observed that 60.50 per cent of the mango growers had a medium size of land holding, followed by 31.00 and 8.50 per cent had small and big size of land holding, respectively.

Kamani (2007) stated that (32.14 per cent) and 22.86 per cent of the organic farmers were medium and semi medium farmers, respectively. The organic farmers with small, large and marginal holding were 18.58 per cent, 16.42 per cent and 10.00 per cent, respectively.

Savaliya (2007) observed that 40.00 per cent and 36.67 per cent respondents were from the small and medium size of land holding category. Whereas only 18.89 per cent and 4.44 per cent respondents were from the marginal and large size of land holding category, respectively.
Parmar (2008) observed that 48.67 per cent of the respondents were found to have big size of land holding, followed by 34.67 per cent and 12.00 per cent of them had medium and small size of land holding, respectively. Rests (4.66 per cent) of them were found in the group of marginal farmers.

Dalsaniya (2010) revealed that 64.17 per cent of sesame growers had medium size of land holding. Whereas 20.00 and 15.83 per cent respondents possessed small and large size of land holding, respectively.

Gohil (2010) indicated that 50.50 per cent of the respondents belonged to medium category of size of land holding groups followed by large (35.00 per cent) and small (14.50 per cent) size of land holding group, respectively.

Shinde (2011) revealed that 52.50 per cent of the cotton growers were big farmers, while 24.17 per cent were medium farmers and 19.16 per cent farmers were small farmers. Only 4.17 per cent of the respondents were marginal farmers.

Humbal (2012) revealed that 65.83 per cent of respondents had medium size of land holding. Whereas 20.83 and 13.33 per cent respondents possessed small and large size of land holding, respectively.

Kunchala (2012) denoted that 34.16 per cent of the respondents were fell under the category of small land holding, followed by medium (27.50 per cent) and marginal (21.67 per cent) land holding. While 16.67 per cent of the farmers fell under the category of big land holding.

Mavani (2012) reported that 64.17 per cent of groundnut growers had medium size of land holding. Whereas 18.33 and 17.50 per cent respondents possessed small and large size of land holding, respectively.

Hadiya (2013) observed that 55.83 per cent of groundnut growers had medium size of land holding. Whereas 36.67 and 7.50 per cent respondents possessed large and small size of land holding, respectively.

Tala (2013) observed that 48.00 per cent of the respondents belonged to small land holding category, followed by 25.33, 22.66 and 4.00 per cent belonged to semi-medium, marginal and medium land holding categories, respectively.
Vasava (2013) found that 55.00 per cent of the hybrid rice growers possessed medium size of land holding, followed by 28.00 and 17.00 per cent of them had small and big size land holding.

Dhayal and Mehta (2015) revealed that majority of farmers belonged to above 2 ha land holding group. This land holding category alone constitutes 64.00 per cent of the total sample. Further, 18.00 per cent were in small farmers category. Whereas remaining 18.00 per cent farmers were in marginal farmers category.

Patel (2016) reported that 40.00 per cent of the cotton growers with DIS were found having small size of land holding (1.01 to 2.0 ha) followed by medium size land holding (35.00 per cent) and size of land holding 15.00 per cent. Only 10.00 per cent of the beneficiary farmers were found having marginal size of land holding.

Kumbhani et al. (2017) concluded that 65.00 per cent of the respondents were found 0.01 to 1.00 ha of land, followed by 34.00 per cent and 5.00 per cent of respondents who had 1.01 to 2.00 ha and 2.01 to 4.00 ha of land holding, respectively.

2.1.2.2 Social participation

Javiya (2004) revealed that 68.00 per cent of the respondents had medium social participation, followed by low (19.00 per cent) and high (13.00 per cent) social participation.

Chavda (2005) concluded that 66.66 per cent of the respondents had medium social participation, followed by low social participation (24.00 per cent) and high social participation (9.34 per cent).

Chavda (2006) reported that 61.11 per cent of the respondents had medium social participation, followed by high (22.22 per cent) and low (16.67 per cent) social participation.

Kotadiya (2006) revealed that 77.44 per cent of the parents of girls had low social participation, followed by high social participation (22.56 per cent).

Patel (2006) found that 56.00 per cent of the pigeon pea growers had membership in one organization, followed by 25.20 per cent, 15.60 per cent and 3.20
per cent of them had membership in more than one organization, no membership in any organization and position holding in rural organization, respectively.

Makwana (2007) revealed that 66.67 per cent of the Girmaldharis had low social participation, followed by medium (20.83 per cent) and high social participation (12.50 per cent).

Savaliya (2007) revealed that 70.00 per cent of the respondents had medium level of social participation, followed by high (20.56 per cent) and low (9.44 per cent) social participation.

Dalsaniya (2010) concluded that 53.33 per cent of the sesame growers had medium level of social participation, followed by high (11.67 per cent) and low (11.67 per cent) social participation.

Gohil (2010) revealed that 69.50 per cent of the respondents had medium social participation. Whereas 16.00 and 14.50 per cent of the respondents had high and low social participation, respectively.

Khodifad (2010) indicated that 70.00 per cent of the respondents had medium level social participation. Whereas only 11.25 per cent of them had high level social participation and 18.75 per cent of respondents were found taking part occasionally in social matters.

Shinde (2011) revealed that 43.33 per cent of the cotton growers had membership in one organization, followed by 25.83 per cent had no membership in any organization, 21.67 per cent had membership in more than one organizations and only 9.17 per cent of the cotton growers were position holder.

Humbal (2012) revealed that 52.50 per cent of the respondents had medium level of social participation, followed by low (33.33 per cent) and high (14.16 per cent) social participation.

Koli (2012) indicated that 75.00 per cent of the coconut growers had medium social participation, followed by 21.30 and 3.70 per cent of them had high and low social participation, respectively.
Kunchala (2012) reported that 48.34 per cent of the respondents had membership in more than one organization. While nearly two fifth (39.16 per cent) of them had membership in one organization. Whereas only 4.16 per cent of them had no membership in any organization and a meagre number 8.34 per cent of the respondents were holding positions in an organization.

Raut et al. (2012) indicated that majority of the cotton growers (76.10 per cent) had low level of social participation.

Hadiya (2013) observed that 59.17 per cent of the groundnut growers had medium level of social participation, followed by 29.17 and 11.66 per cent of them had low and high level of social participation, respectively.

Patel (2013) concluded that 56.66 per cent of respondents had membership in more than one organization, followed by 23.34 per cent and 12.00 per cent of them, who had membership in one organization and no membership, respectively. While only 8.00 per cent of the respondents had membership along with position holding in one organization.

Tala (2013) traced out that majority of the respondents of different farming systems (61.33 per cent) had membership in one organisation, followed by 22.66 and 16.00 per cent of them had membership in more than one organisation and no membership respectively. None of them occupied any post in organisation.

Vasava (2013) denoted that 61.00 per cent of the hybrid rice growers had membership in one organisation, followed by 13.00 per cent had membership in more than one organisation; while 24.00 and 2.00 per cent had no membership and position holding in organisation, respectively.

Gulkari (2014) indicated that 43.64 per cent of the drip irrigated banana growers had membership in one organization, followed by 41.82 per cent, 9.09 per cent and 5.45 per cent of them had no membership in any organization, membership in more than one organization and position holder in any organization, respectively.

Dhayal and Mehta (2015) revealed that 30.00 per cent farmers were not the member of an organization, 45.00 per cent were the member of one organization, and 25.00 per cent farmers had possessed the position of office bearer.
Patel (2016) studied that 67.22 per cent of the cotton growers were having membership in more than one organization. Only 11.11 per cent respondents were having membership in one organization. Whereas 17.78 per cent respondents were office bearer in the organization. While only 3.89 per cent cotton growers were having no membership in any organization.

Dobariya et al. (2017) pointed out that 45.00 per cent of the beneficiary farmers belonged to membership in more than one organization. Whereas 47.00 per cent of non beneficiary farmers had membership in one organization.

Kumbhani et al. (2017) concluded that majority of the respondents (71.00 per cent) were participated in social activities. While 29.00 per cent respondents were not participated in social activities.

2.1.3 COMMUNICATION CHARACTERISTICS

2.1.3.1 Mass media exposure

Patel (2004) observed that 69.17 per cent of the wheat growers had medium level of mass media exposure, followed by 18.33 per cent and 12.50 per cent with low level and high level of mass media exposure, respectively.

Vasava (2005) stated that 60.00 per cent of the pigeon pea growers had medium exposure to mass media and an equal per cent (20.00 per cent) of them were having low and higher level of mass media exposure.

Tavethiya (2006) found that 60.00 per cent of the cumin growers had medium mass media exposure. Whereas 20.00 per cent of the respondents had low and 20.00 per cent of the respondents had high mass media exposure.

Bharad (2007) found that 53.50 per cent of the mango growers had medium level of mass media exposure. Whereas 43.50 and 3.00 per cent of them had high and low level of mass media exposure, respectively.

Borole (2010) stated that 63.53 per cent of the demonstrated paddy growers had medium exposure to mass media exposure, followed by 24.71 per cent and 11.76 per cent with high and low exposure to mass media, respectively.
Darandale (2010) revealed that majority of the cotton growers (62.50 per cent) had medium level of mass media exposure.

Tilara (2010) reported that large majority of the Bt. cotton growers (85.83 per cent) had medium to high level of mass media exposure.

Shinde (2011) revealed that 62.50 per cent of cotton growers had medium exposure to mass media, followed by 21.67 per cent and 15.83 per cent had high and low exposure to mass media, respectively.

Humbal (2012) revealed that 56.66 per cent of the respondents had medium level of mass media exposure. Whereas 23.33 and 20.00 per cent of them had high and low level of mass media exposure, respectively.

Koli (2012) indicated that 63.89 per cent of coconut growers had medium exposure to mass media. Which was followed by 22.22 per cent and 13.89 per cent had high and low exposure to mass media exposure, respectively.

Mavani (2012) revealed that 56.67 per cent of the respondents had medium level of mass media exposure. Whereas 25.00 and 18.33 per cent of them had high and low level of mass media exposure, respectively.

Gulkari (2014) stated that majority of the banana growers (59.09 per cent) had high level of mass media exposure, followed by 24.55 per cent of them were with very high level of mass media exposure. While 13.64 per cent and 2.73 per cent were with medium and low level of mass media exposure, respectively.

Parmar (2014) concluded that majority of the respondents (50.84 per cent) had medium level of mass media exposure. Whereas 23.34 per cent of respondents had high level of mass media exposure, while 18.33 per cent of respondents had low mass media exposure. Only 5.83 per cent and 1.66 per cent respondents had very high and very low mass media exposure, respectively.

Salman (2014) disclosed that 41.67 per cent of cotton growers had medium level of mass media exposure, followed by high, very high, and low level of mass media exposure with 32.50 per cent, 19.16 per cent and 6.67 per cent, respectively.
Borate (2015) observed that 45.50 per cent of the banana growers had very high level of mass media exposure, followed by of them were with high level of mass media exposure (44.50 per cent). Only 6.50 per cent and 3.00 per cent of them were having medium and low level of mass media exposure, respectively. Average mass media exposure score was 12, which also proved that the banana growers had high mass media exposure.

2.1.4 PSYCHOLOGICAL CHARACTERISTICS

2.1.4.1 Scientific orientation

Christian (2001) observed that 43.33 per cent of the cotton growers had high level of scientific orientation, followed by 36.67 per cent and 20.00 per cent of them who had low and medium level of scientific orientation, respectively.

Dongardive (2002) concluded that majority of chilli growers (83.33 per cent) had high level of scientific orientation, followed by (13.33 per cent) and (3.33 per cent) of them had medium and low level of scientific orientation, respectively.

Pandya (2004) indicated that 67.50 per cent of the date palm growers were found to have medium level of scientific orientation.

Makwana (2005) concluded that 62.00 per cent of the banana growers had medium scientific orientation. Whereas 19.33 and 18.67 per cent of banana growers had high and low scientific orientation, respectively.

Patel (2005a) concluded that 60.00 per cent of the chilli growers had medium scientific orientation. Whereas 22.00 per cent of the chilli growers had high scientific orientation and rest 18.00 per cent had low scientific orientation.

Rabari (2006) concluded that 76.66 per cent of the tomato growers had medium level of scientific orientation. While 16.67 and 6.67 per cent of them had high and low level of scientific orientation, respectively.

Zala (2008) reported that majority of the cotton growers (61.37 per cent) had medium level of scientific orientation.
Athwale (2009) stated that 62.50 per cent of the pigeon pea growers were found medium scientific orientation, followed by low (20.84 per cent) and high (16.66 per cent) scientific orientation.

Rathod (2009) reported that 60.00 per cent of the chilli growers had medium scientific orientation, followed by 23.34 per cent had high scientific orientation and 16.66 per cent had low scientific orientation.

Sangeetha et al. (2009) studied that majority of the cotton farmers (40.83 per cent) were high scientific orientation.

Darandale (2010) indicated that 64.16 per cent of the respondents had medium level of scientific orientation. About 20.00 per cent of the respondents had high scientific orientation and rest 15.84 per cent had low scientific orientation.

Shitre (2010) that 55.00 per cent of the potato growers had medium level of scientific orientation. While 28.33 per cent and 16.67 per cent of them had high and low level of scientific orientation, respectively.

Tilara (2010) reported that majority of the Bt. cotton growers (85.00 per cent) had medium to high level of scientific orientation.

Patel (2011) revealed that majority of the respondent farmers (57.50 per cent) had medium level of scientific orientation. Whereas 33.33 per cent and 9.17 per cent of them had low and high level of scientific orientation, respectively.

Shinde (2011) revealed that majority of the cotton growers (60.00 per cent) had medium level of scientific orientation and equally 20.00 per cent of cotton growers had high and low scientific orientation.

Dhenge (2013) observed that 65.00 per cent of the respondents found to be in the medium level of risk orientation, followed by 20.00 per cent in high level of risk orientation. Whereas 15.00 per cent were found to be in low level of risk orientation.

Sangada (2015) indicated that 51.67 per cent of the groundnut growers had medium scientific orientation, followed by 35.00 per cent, 10.00 per cent and 3.33 per cent had high, very high, and low scientific orientation. No respondent were found under the category of very low.
Patel (2016) reported that 45.56 per cent of the cotton growers of DIS were having medium scientific orientation, followed by high scientific orientation (27.22 per cent) and very high scientific orientation (13.33 per cent). While 12.78 per cent respondents were having low and 1.11 per cent having very low scientific orientation.

Dobariya et al. (2017) pointed out that 50.00 per cent of beneficiary farmers and 65.00 per cent of non beneficiary farmers had medium level of scientific orientation.

2.1.4.1 Risk orientation

Badhe (2009) concluded that 53.33 per cent of the brinjal growers had medium level of risk orientation. While 26.67 and 20.00 per cent of them had high level and low level of risk orientation, respectively.

Desale (2009) revealed that 54.17 per cent of the castor growers had medium risk orientation. Whereas remaining 25.00 and 20.83 per cent of them had high and low level of risk orientation, respectively.

Borole (2010) found that 54.11 per cent of the demonstrated paddy growers had medium level of risk orientation, followed by high and low risk orientation with 30.60 per cent and 15.29 per cent, respectively.

Darandale (2010) indicated that 68.34 per cent of the respondents had medium level of risk orientation, followed by high and low risk orientation with 17.50 per cent and 14.16 per cent, respectively.

Shinde (2011) revealed that 58.33 per cent of the cotton growers had medium level of risk orientation. While high and low risk orientation with 22.50 per cent and 19.17 per cent, respectively.

2.1.4.1 Innovativeness

Javiya (2004) stated that 62.00 per cent of groundnut growers had medium level of innovativeness, followed by low (21.00 per cent) and high (17.00 per cent) level of innovativeness.
Sahoo (2004) found that 57.50 per cent of groundnut growers were found to have medium innovativeness. Whereas 15.84 and 26.66 per cent of them had low and high innovativeness, respectively.

Chavda (2005) concluded that majority of the Bt. cotton growers (84.66 per cent) had medium innovativeness, followed by 8.67 per cent and 6.67 per cent who had high and low level of innovativeness, respectively.

Bharad (2007) revealed that 55.00 per cent of mango growers had best level of innovativeness, followed by average (29.00 per cent) and poor (16.00 per cent) level of innovativeness of mango growers.

Kamani (2007) found that 45.71 per cent of the organic farmers were found to have high innovativeness. Whereas 35.72 and 18.57 per cent of them had medium and low innovativeness, respectively.

Gohil (2010) observed that 43.00 per cent of the respondents were found to have medium innovativeness, followed by 34.00 per cent and 23.00 per cent of them had low and high innovativeness, respectively.

Khodifad (2010) revealed that 28.75 per cent of the groundnut growers were early majority, followed by 21.88 per cent early adopter and 18.12 per cent late majority. Only 14.37 per cent respondents were innovator and remaining 16.88 per cent respondents were laggards.

Humbal (2012) found that 49.17 per cent of the respondents were found to have medium innovativeness. Whereas 35.83 and 15.00 per cent of them had high and low innovativeness, respectively.

Mavani (2012) showed that 40.00 per cent of the groundnut growers were found to have medium innovativeness. Whereas 37.50 per cent and 22.50 per cent of them had high and low innovativeness, respectively.

Hadiya (2013) revealed that 35.00 per cent of the respondents were early majority, followed by early adopter 22.50 per cent and late majority 20.00 per cent. Only 17.50 per cent respondents were innovator and remaining 5.00 per cent respondents were laggards.
Patoliya (2013) concluded that 46.67 per cent FLD groundnut growers had medium innovativeness, followed by 35.00 per cent and 18.33 per cent with high and low level of innovativeness, respectively. Whereas in case of non-FLD groundnut growers had 41.66 per cent, 30.00 per cent and 31.67 per cent of medium, high and low level of innovativeness, respectively.

Dobariya et al. (2017) pointed out that 63.00 per cent of the beneficiary farmers and 87.00 per cent of non beneficiary farmers had medium level of innovativeness.

2.2 KNOWLEDGE LEVEL OF COTTON GROWERS ABOUT INTEGRATED PEST MANAGEMENT

Desai et al. (2000) revealed that 67.00 per cent of cotton growers possessed medium level of knowledge about recommended cultivation practices of rainfed cotton. While 33.00 per cent had high level of knowledge.

Patel et al. (2003) observed that almost all of the hybrid tobacco GTH-1 growers had knowledge of land preparation, time of transplanting, topping and desuckering. A great majority of them had knowledge about the technologies namely, time of transplanting (70.00 per cent), fertilizer management (87.00 per cent), irrigation management (88.0 per cent), knowledge about harmful insect and pests of tobacco (85.0 per cent), whereas majority (54.0 per cent) of them had knowledge about control measures of these pests. Most of all the hybrid tobacco GTH –1 growers had knowledge of leaf curl diseases but only 58.00 per cent of them had knowledge about its control measures.

Chavada (2005) concluded that most of Bt. cotton growers (81.33 per cent) had medium level of knowledge followed by 10.67 per cent has high and 8.00 per cent had low level of knowledge about distinctive features of Bt. cotton growers.

Jadeja (2008) revealed that 73.00 per cent of the respondents had medium level of knowledge. Whereas 13.00 per cent had low and 14.00 per cent had high level of knowledge about indigenous scientific practices.
Sangeetha et al. (2009) revealed that 36.67 per cent of the respondents had medium level of knowledge about recommended practices of cotton cultivation followed by low (35.00 per cent) and high (28.33 per cent) knowledge levels.

Borkhani et al. (2011) regression analysis indicated that about 68.50 per cent of the variation in the extent of Integrated Pest Management practices application by paddy farmers could be explained by variables consisting level of knowledge toward Integrated Pest Management practices.

Shinde (2011) reported that 57.50 per cent of the cotton growers had medium level of knowledge regarding Integrated Pest Management practices, while 23.37 and 19.17 per cent of the cotton growers had high and low level of knowledge regarding Integrated Pest Management practices, respectively.

Dhenge (2013) revealed that 82.50 per cent belonged to medium category of knowledge level and low level of knowledge possessed by 9.17 per cent of the respondents. Whereas 8.33 per cent of respondents were include in high level of knowledge.

Kabir (2015) found that 51.90 per cent of the respondents fell in medium knowledge category, followed by 27.80 per cent in poor knowledge category and only 20.40 per cent in high knowledge category.

Dodiya et al. (2016) studied that majority of the respondents (80.00 per cent) were found with medium to high level of knowledge about Integrated Pest Management practices of Bt. cotton crop.

2.3 ATTITUDE OF COTTON GROWERS TOWARDS INTEGRATED PEST MANAGEMENT

Borkhani et al. (2011) observed that 53.85 per cent of farmers had negative and 46.15 per cent of farmers had positive and relatively positive attitude towards effectiveness of IPM technologies.

Shinde (2011) reported that 64.16 per cent of cotton growers had moderately favourable attitude towards Integrated Pest Management (IPM) practices, followed by 18.34 per cent and 17.50 per cent of them had less favourable and highly favourable attitude towards Integrated Pest Management (IPM) practices, respectively.
Dodiya et al. (2016) studied that majority of the respondents (73.33 per cent) were found with high level of attitude about Integrated Pest Management practices of Bt. cotton crop.

Kadam (2016) found that majority of the cotton growers 56.00 per cent had developed favourable attitude only 15.00 per cent of them had less favourable attitude and 29.00 per cent of the respondents had developed most favourable attitude towards Integrated Pest Management (IPM) technology programme on cotton.

2.4 ASSOCIATION BETWEEN SELECTED CHARACTERISTICS OF COTTON GROWERS AND THEIR KNOWLEDGE ABOUT INTEGRATED PEST MANAGEMENT

2.4.1 Age and Knowledge

Chavda (2005) observed that there was non-significant association between extent of knowledge of farmers and their age.

Singh (2007) concluded that age of the tobacco growers had no any correlation with their knowledge about recommended tobacco production technology.

Patel et al. (2008) reported that age of trained cotton growers was positively and significantly associated with their knowledge about Integrated Pest Management in cotton.

Basanayak (2009) revealed that age was positive and significantly associated with knowledge level of papaya growers.

Dalsaniya (2010) concluded that there was negative and significant association between extent of knowledge of farmers and their age.

Humbal (2012) concluded that there was negative and significant relationship between knowledge of recommended crop production technology of castor as intercrop with groundnut and age of the respondents.

Manjunath et al. (2012) indicated that education was significantly associated with the knowledge level of cotton growers.
Hadiya (2013) studied that there was negative and significant relationship between knowledge of recommended practices of *kharif* groundnut growers and their age.

Dhayal and Mehta (2015) pointed out that age of the green gram growers was significantly correlated with their knowledge level of farmers about green gram production technology.

Patel and Sanwal (2015) revealed that there was positive and non-significantly correlated with knowledge level and age regarding Integrated Pest Management (IPM) strategy of hybrid cotton crop.

Rajput (2016) concluded that there was a negative and significant association between the extent of knowledge about IPM in cumin and age of respondents.

Chaudhari and Chauhan (2017) stated that there was negative and non significant relationship between age and knowledge of banana growers about strategic involvement of public and private sectors.

Dobariya *et al.* (2017) pointed out that there was negative and significant association between knowledge of improved agricultural technologies of gram crop and age of beneficiary farmers.

### 2.4.2 Education and Knowledge

Kalsakar *et al.* (1999) revealed that education had positive and significant correlation with knowledge about Integrated Pest Management practices.

Kumar (2003) reported that education was significantly associated with the knowledge level of Bt. cotton growers.

Joshi (2004) indicated that, education had positive and significant correlation with knowledge level of cotton growers regarding modern practices of cotton cultivation.

Chauhan (2008) concluded that there was positive and significant linear association between extent of knowledge of farmers and their education.
Jadeja (2008) inferred that there was positive and significant association between farmers’ extent of knowledge about use of different parts of neem and their education.

Patel et al. (2008) reported that education of trained cotton growers was positive and significantly associated with their knowledge about Integrated Pest Management.

Satasiya (2008) concluded that there was positive and significant association between extent of knowledge of farmers and their education.

Dalsaniya (2010) observed that there was positive and significant linear association between extent of knowledge of farmers and their education.

Manjunath et al. (2012) indicated that education was significantly associated with the knowledge level of cotton growers.

Hadiya (2013) concluded that there was positive and highly significant relationship between knowledge of recommended practices of kharif groundnut and education of the respondents.

Dhayal and Mehta (2015) pointed out that there was positive and highly significant relationship between knowledge level and education of farmers.

Patel and Sanwal (2015) revealed that there was positive and significantly correlated with knowledge level and education regarding IPM strategy of hybrid cotton crop.

Rajput (2016) concluded that there was a positive and highly significant relationship between extent of knowledge about Integrated Pest Management (IPM) in cumin of respondents and education of respondents.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between education and knowledge of banana growers about strategic involvement of public and private sectors.

Dobariya et al. (2017) pointed out that there was negative and non significant association between knowledge of improved agricultural technologies of gram crop and negative of beneficiary farmers.
2.4.3 Farm experience and Knowledge

Patel et al. (2002) reported that farming experience had shown significant and positive relationship with knowledge of sugarcane production technology.

Trivedi and Trivedi (2002) observed that experience of the farmers in flower cultivation had shown non-significant correlation with their knowledge of lily cultivation.

Patel et al. (2003) reported that farmer’s experience of onion cultivation had shown positive and significant relationship with knowledge about onion cultivation.

Singh (2007) concluded that farming experience of the tobacco growers did not exhibited any significant correlation with their knowledge about recommended tobacco production technology.

Sangeetha et al. (2009) pointed out that there was a positive and significant relationship between knowledge levels of respondents with their farming experience.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between farming experience and knowledge of banana growers about strategic involvement of public and private sectors.

Dobariya et al. (2017) pointed out that there was negative and non-significant association between knowledge of improved agricultural technologies of gram crop and farming experience of beneficiary farmers.

2.4.4 Training received and Knowledge

Patel and Sanwal (2015) revealed that there was positive and significant correlation between knowledge level of cotton growers and training received by cotton growers regarding Integrated Pest Management (IPM) in hybrid cotton.

2.4.5 Size of family and Knowledge

Shinde (2011) revealed that a shows negative and non-significant relationship with attitude of the cotton growers towards Integrated Pest Management.

Rajput (2016) concluded that there was a non-significant relationship between extent of knowledge and size of family of respondents.
Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between size of family and knowledge of banana growers about strategic involvement of public and private sectors.

Dobariya et al. (2017) pointed out that there was negative and non-significant association between knowledge of improved agricultural technologies of gram crop and family size of beneficiary farmers.

**2.4.6 Annual income and Knowledge**

Kumar (2003) indicated that annual income was significantly associated with knowledge level of Bt. cotton growers about Bt. cotton.

Joshi (2004) indicated that income was significantly associated with the knowledge level of cotton growers about modern practices of cotton cultivation.

Patel (2005) revealed that there was non-significant relationship between level of knowledge of the respondents and their annual income.

Chauhan (2008) inferred that there was non-significant relation observed between extent of knowledge and their annual income.

Jadeja (2008) concluded that there was no association between farmers’ extent of knowledge about use of different parts of neem and their annual income.

Satasiya (2008) found that there was no association between level of knowledge of demonstrator and non-demonstrator farmers and their annual income.

Humbal (2012) reported that there was non-significant relationship between knowledge and their annual income.

Hadiya (2013) inferred that there was non-significant relationship between knowledge and their annual income.

Dhayal and Mehta (2015) pointed out that there was a positive and highly significant relationship between knowledge and annual income of respondents.

Patel and Sanwal (2015) concluded that annual income significantly correlated with knowledge level regarding Integrated Pest Management (IPM) in cotton crop.
Rajput (2016) concluded that there was a non-significant relationship between extent of knowledge and annual income of respondents.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between annual income and knowledge of banana growers about strategic involvement of public and private sectors.

2.4.7 Size of land holding and Knowledge

Sahoo (2004) observed that there was no association between extent of knowledge of respondents and their size of land holding.

Patel (2005) said that there was positive and significant association between extent of knowledge of the respondents and their size of land holding.

Chauhan (2008) inferred that there was no relationship between knowledge of organic farming practices and size of land holding of the respondents.

Patel et al. (2008) reported that land holding of trained cotton growers was positively and significantly associated with their knowledge about Integrated Pest Management.

Satasiya (2008) inferred that there was no relationship between knowledge of castor production practices and size of land holding of the respondents.

Dalsaniya (2010) concluded that there was no relationship between knowledge of sesame production practices and size of land holding of the respondents.

Humbal (2012) inferred that there was positive and significant relationship between knowledge of recommended crop production technology of castor as intercrop with groundnut and size of land holding of the respondents.

Hadiya (2013) pointed out that there was positive and significant relationship between knowledge of recommended practices of kharif groundnut and size of land holding of the respondents.

Dhayal and Mehta (2015) pointed out that size of land holding had highly significant correlated with knowledge level of respondents.
Patel and Sanwal (2015) revealed that land holding was positive and non-significantly correlated with knowledge level regarding Integrated Pest Management (IPM) strategy of hybrid cotton crop.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between size of land holding and knowledge of banana growers about strategic involvement of public and private sectors.

Dobariya et al. (2017) pointed out that there was positive and non significant association between knowledge of improved agricultural technologies of gram crop and land holding of beneficiary farmers.

2.4.8 Social participation and Knowledge

Chavda (2005) concluded that there was positive and significant association between Bt. cotton growers’ knowledge about distinctive features of Bt. cotton and their social participation.

Dhayal and Mehta (2015) pointed out that social participation was positively and significantly correlated with the Knowledge level of the farmers.

Rajput (2016) concluded that there was a positive and highly significant relationship between extent of knowledge and social participation of respondents.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between social participation and knowledge of banana growers about strategic involvement of public and private sectors.

Dobariya et al. (2017) pointed out that there was positive and significant association between knowledge of improved agricultural technologies and social participation of beneficiary farmers.

2.4.9. Mass media exposure and Knowledge

Sahoo (2004) inferred that there was positive and significant association between level of knowledge and their exposure to information sources.

Tavethiya (2006) inferred that there was positive and significant association between the level of knowledge and their exposure to information sources.

Makwana (2007) inferred that there was negative association between the level of knowledge and their exposure to information sources.
Patel et al. (2008) reported that mass media exposure of trained cotton growers was positively and significantly associated with their knowledge about Integrated Pest Management.

Dalsaniya (2010) concluded that there was positive and significant association between the level of knowledge of farmers and their mass media exposure.

Humbal (2012) inferred that there was positive and significant relationship between the knowledge of recommended crop production technology of castor as intercrop with groundnut and mass media exposure of the respondents.

Hadiya (2013) observed that there was positive and highly significant relationship between the knowledge of recommended practices of kharif groundnut and mass media exposure of the respondents.

Patel and Sanwal (2015) reveled that there was positive and significant correlation between knowledge level of cotton growers and mass media exposure by cotton growers regarding Integrated Pest Management (IPM) in hybrid cotton.

2.4.10 Scientific orientation and Knowledge

Patel et al. (2008) indicated that scientific orientation was highly and significantly correlated with knowledge level of IPM technology in cotton crop for trained cotton growers. Whereas in case of untrained cotton growers there was no significant relationship between scientific orientation and knowledge about IPM technology.

Sangeetha et al. (2009) found that there was a positive and significant relationship between knowledge levels of respondents with their scientific orientation.

Patel and Sanwal (2015) reveled that there was positive and significant correlation between knowledge level of cotton growers and scientific orientation by cotton growers regarding Integrated Pest Management (IPM) in hybrid cotton.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between scientific orientation and knowledge of banana growers about strategic involvement of public and private sectors.
Dobariya et al. (2017) pointed out that there was positive and non-significant association between knowledge of improved agricultural technologies of gram crop and scientific orientation of beneficiary farmers.

2.4.11 Risk orientation and Knowledge

Patel et al. (2008) reported that risk orientation of trained cotton growers was positively and significantly associated with their knowledge about Integrated Pest Management.

Patel and Sanwal (2015) reveled that there was positive and significant correlation between knowledge level of cotton growers and risk orientation by cotton growers regarding Integrated Pest Management in hybrid cotton.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between risk orientation and knowledge of banana growers about strategic involvement of public and private sectors.

2.4.12 Innovativeness and Knowledge

Patel (2005b) found that there was positive and significant association between the level of knowledge of farmers in relation to organic farming practices and their innovativeness.

Chauhan (2008) reported that there was positive and significant association between the level of knowledge of farmers and their innovativeness.

Satasiya (2008) reported that there was positive and significant association between the level of knowledge of farmers and their innovativeness.

Kumbhani (2009) inferred that there was positive and significant association between the level of knowledge of farmers and their innovativeness.

Humbal (2012) concluded that there was positive and highly significant relationship between the knowledge of recommended crop production technology of castor as intercrop with groundnut and innovativeness of the respondents.
Hadiya (2013) studied that there was positive and highly significant relationship between the knowledge of recommended practices of *kharif* groundnut and innovativeness of the respondents.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between innovativeness and knowledge of banana growers about strategic involvement of public and private sectors.

Dobariya *et al.* (2017) pointed out that there was highly significant association between knowledge of improved agricultural technologies and innovativeness of beneficiary farmers.

### 2.5 ASSOCIATION BETWEEN SELECTED CHARACTERISTICS OF COTTON GROWERS AND THEIR ATTITUDE TOWARDS INTEGRATED PEST MANAGEMENT

#### 2.5.1 Age and Attitude

Patel *et al.* (2007) found that age of the respondents had negative and significant correlation with their attitude towards Integrated Pest Management strategy.

Zala (2008) indicated that age of cotton growers had negative and non-significant correlation with their attitude towards the cotton cultivation.

Rahman (2010) found in his study that age of the farmers had non-significant relationship with attitude of the farmers towards Integrated Pest Management (IPM) practices.

Shinde (2011) revealed that age shows negative and non-significant relationship with attitude of the cotton growers towards Integrated Pest Management.

Chaudhari and Chauhan (2017) stated that there was negative and non-significant relationship between age and attitude of banana growers towards strategic involvement of public and private sectors.

Patel *et al.* (2017) concluded that age had negative and non-significant relationship with their attitude towards training programme.
2.5.2 Education and Attitude

Patel and Chauhan (2004) observed that education was positively and significantly related with attitude towards Integrated Pest Management (IPM) strategy.

Parvez (2007) concluded from his study that there was positive significant relationship between education of the farmers and their attitude towards Integrated Pest Management (IPM) for HYVs production.

Patel et al. (2007) found that education of the respondents had positive and significant correlation with their attitude towards Integrated Pest Management strategy.

Rahman (2010) found significant positive relationship between education of the farmers and their attitude towards Integrated Pest Management (IPM) practices.

Shinde (2011) concluded that education had positive and highly significant correlation with attitude of the cotton growers towards Integrated Pest Management.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between education and attitude of banana growers towards strategic involvement of public and private sectors.

Patel et al. (2017) concluded that education had positive and non-significant relationship with their attitude towards training programme.

2.5.3 Farm experience and Attitude

Patel and Chauhan (2004) observed that farming experience was negatively but significantly related with attitude towards Integrated Pest Management (IPM) strategy.

Patel et al. (2007) revealed that there was positive and significant relation between farm experience and attitude towards Integrated Pest Management strategy.

Zala (2008) observed that farming experience was significantly associated with attitude towards cotton cultivation.
Shinde (2011) concluded that farm experience had positive and highly significant correlation with attitude of the cotton growers towards Integrated Pest Management.

Chaudhari and Chauhan (2017) stated that there was negative and non-significant relationship between farm experience and attitude of banana growers towards strategic involvement of public and private sectors.

Patel et al. (2017) concluded that farm experience had positive and significant relationship with their attitude towards training programme.

2.5.4 Training received and Attitude

Patel (2005a) found that training received had positive and significant relationship with attitude of farmers towards chilli cultivation technology.

Rahman (2010) observed in his study that there was positive and significant relationship between training exposure and attitude of the farmers towards Integrated Pest Management (IPM) practices.

2.5.5 Size of family and Attitude

Patel (2006) indicated that there was highly significant relationship between size of family and attitude of paddy growers towards the use of pesticides.

Patel et al. (2007) revealed that there was negative and non-significant relation between size of family and attitude towards Integrated Pest Management strategy.

Darandale (2010) indicated that size of family of maize growers had negative and non-significant correlation with their attitude organic farming.

Shinde (2011) revealed that size of family shows negative and non-significant relationship with attitude of the cotton growers towards Integrated Pest Management.

Chaudhari and Chauhan (2017) stated that there was positive and non significant relationship between size of family and attitude of banana growers towards strategic involvement of public and private sectors.
2.5.6 Annual income and Attitude

Haider (2005) observed that annual income had a positive relationship with knowledge and practice of Integrated Pest Management (IPM) in vegetable cultivation.

Patel et al. (2007) revealed that there was positive and significant relation between annual income and attitude towards Integrated Pest Management strategy.

Borole (2010) concluded that annual income of the family had positive and significant relationship with the attitude of the respondents towards SRI technique in paddy.

Darandale (2010) observed that annual income of maize growers had highly significant relation with the attitude towards organic farming.

Shinde (2011) concluded that annual income had positive and highly significant correlation with attitude of the cotton growers towards Integrated Pest Management.

Chaudhari and Chauhan (2017) stated that there was positive and high significant relationship between annual income and attitude of banana growers towards strategic involvement of public and private sectors.

2.5.7 Land holding and Attitude

Patel (2005b) indicated that size of land holding had positive and non-significant relationship with attitude.

Patel (2006) indicates that attitude towards the use of pesticides with the size of land holding had non-significant relationship.

Patel et al. (2007) revealed that there was positive and non-significant relation between land holding and attitude towards Integrated Pest Management strategy.

Zala (2008) indicated that attitude of cotton growers towards the cotton cultivation technology with the size of land holding had non-significant relationship.
Darandale (2010) revealed that attitude of the respondents towards organic farming practices in maize crop with the size of land holding had highly significant relationship.

Shinde (2011) concluded that land holding had positive and highly significant correlation with attitude of the cotton growers towards Integrated Pest Management.

Chaudhari and Chauhan (2017) stated that there was positive and non-significant relationship between size of land holding and attitude of banana growers towards strategic involvement of public and private sectors.

Patel et al. (2017) concluded that size of land holding had negative and non-significant relationship with their attitude towards training programme.

2.5.8 Social participation and Attitude

Patel (2005b) indicated that there was positive and significant association between level of attitude of respondents towards organic farming practices and their social participation.

Patel (2006) indicated that attitude of paddy growers towards the use of pesticides in paddy crop has significant relationship with social participation.

Pise (2006) revealed that social participation of banana growers had positive and significant relationship with attitude towards banana cultivation technology.

Zala (2008) indicated that attitude of cotton growers towards the cotton cultivation had highly significant relationship with social participation.

Darandale (2010) found that there was negative and non-significant relationship between social participation and attitude of respondents towards organic farming practices in maize crop.

Shinde (2011) concluded that social participation had positive and highly significant correlation with attitude of the cotton growers towards Integrated Pest Management.
Chaudhari and Chauhan (2017) stated that there was positive and significant relationship between social participation and attitude of banana growers towards strategic involvement of public and private sectors.

2.5.9 Mass media exposure and attitude

Zala (2008) observed that mass media exposure of cotton growers had highly significant relation with the attitude towards cotton cultivation.

Darandale (2010) revealed that mass media exposure of maize growers had highly significant relation with the attitude towards organic farming.

Shinde (2011) concluded that mass media exposure had positive and highly significant correlation with attitude of the cotton growers towards Integrated Pest Management.

2.5.10 Scientific orientation and attitude

Zala (2008) indicated that scientific orientation of cotton grower has non-significant relation with their attitude towards cotton cultivation.

Borole (2010) observed positive and highly significant correlation between scientific orientation and attitude of demonstrated paddy growers towards SRI technique.

Darandale (2010) reported that tribal maize growers' scientific orientation was highly and significantly correlated with attitude towards organic farming practices in maize crop.

Shinde (2011) concluded that scientific orientation had positive and highly significant correlation with attitude of the cotton growers towards Integrated Pest Management.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between scientific orientation and attitude of banana growers towards strategic involvement of public and private sectors.

Patel et al. (2017) concluded that scientific orientation had positive and significant relationship with their attitude towards training programme.
2.5.11 Risk orientation and Attitude

Patel (2005b) indicated that the risk orientation of the respondents had non-significantly associated with their level of attitude.

Zala (2008) indicated that risk orientation of cotton grower has highly significant relationship with their attitude towards cotton cultivation.

Darandale (2010) reported that risk orientation had highly significant relationship with attitude towards organic farming practices in maize crop.

Shinde (2011) concluded that risk orientation had positive and highly significant correlation with attitude of the cotton growers towards Integrated Pest Management.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between risk orientation and attitude of banana growers towards strategic involvement of public and private sectors.

2.5.12 Innovativeness and Attitude

Saravanan et al. (2000) reported that there was positive and significant correlation between innovativeness of the farmers who were utilizing private extension services and their attitude towards private extension services.

Gajbhiya (2006) concluded that farmer’s innovativeness had positive and significant relationship with their attitude towards agricultural research.

Kunchala (2012) revealed that there was positive and highly significant relationship between level of innovativeness of progressive farmers and their attitude towards private extension services.

Smitha (2013) reported that there was positive and significant relationship between farmer’s innovativeness and their attitude towards green house technology.

Chaudhari and Chauhan (2017) stated that there was positive and highly significant relationship between innovativeness and attitude of banana growers towards strategic involvement of public and private sectors.
Patel et al. (2017) concluded that innovativeness had positive and significant relationship with their attitude towards training programme.

2.6 CONSTRAINTS FACED BY COTTON GROWERS IN ADOPTION OF INTEGRATED PEST MANAGEMENT

Bhosale (2010) observed that major constraints faced by rural youth were: lack of knowledge regarding plant protection measures (90.83 per cent), high cost of chemicals and fertilizers (79.16 per cent), non-availability of VLW for guidance at a time (77.50 per cent), non-availability of resistant varieties (68.33 per cent), lack of knowledge regarding dose of fertilizers (66.67 per cent), chemicals are not available as and when required (65.00 per cent), irregular supply of electricity (50.00 per cent) and lack of time due to educational activity (25.00 per cent).

Shinde (2011) concluded that important constraints endorsed by the cotton growers in adoption of Integrated Pest Management (IPM) practices of cotton crop were: first non-availability of training in time (63.33 per cent) followed by Lack of scientific information (56.67 per cent), Lack of timely technical advice (55.83 per cent), High cost of plant protection appliances (55.00 per cent), non-availability of credits in time (53.33 per cent), non-availability of plant protection appliances (50.83 per cent), Lack of skilled labours (44.17 per cent) and high cost and non-availability of labours (35.83 per cent). So the non-availability of training in time, lack of scientific information lack of timely technical advice were the major constraints as perceived by the cotton growers in adoption of Integrated Pest Management practices of cotton crop.

Rajput (2016) reported that the major constraints faced by respondents in adoption of Integrated Pest Management (IPM) in cumin were: Inadequate demonstrations on Integrated Pest Management (IPM) technologies, lack of knowledge about pests’ life cycle and their infestation on cumin, lack of trainings on IPM technologies, non-availability of trichoderma at local market, lack of proper knowledge about insect- pests’ damaging stages, Supply of inferior quality of biofertilizers, lack of subsidy from government on IPM control measures, lack of knowledge about botanical pesticide, lack of knowledge about bio-pesticide, lack of skill about bio-pesticide application in cumin, non-availability of neem cake at local level.
2.7 SUGGESTIONS BY COTTON GROWERS TO OVERCOME CONSTRAINTS FACED BY THEM IN ADOPTION OF INTEGRATED PEST MANAGEMENT

Chavda (2005) reported the suggestions offered by the cotton growers were: sucking pest resistant varieties should be developed (100 per cent) followed by seed should available in time on low cost (90.00 per cent), wilt resistant variety should be developed (80.00 per cent), Bt. gene should be incorporated in desi varieties (66.60 per cent), Govt. should provide training to farmers for Bt. cotton cultivation (60.00 per cent), varieties should be developed which is suitable all type of soils (53.30 per cent), remunerative price of cotton should made available (40.00 per cent), there must be regular electricity supply at the time of critical stages of crop for irrigation (26.60 per cent) and sufficient and timely credit facilities should be made available (16.60 per cent) to the cotton growers.

Bhosale (2010) reported that the rural youth suggestions were: as training on new technologies should be imparted to the rural youth (93.33 per cent), technical guidance should be provided well in advance before start of paddy season (90.00 per cent), regular and timely visit of VLW (61.66 per cent), seeds of resistant variety should be available to the farmer at local level (81.66 per cent), training should be provided regarding use of agro-chemicals (60.00 per cent), guidance should be provided to raise nursery (58.00 per cent) and sufficient electric power should be available (37.50 per cent).

Shinde (2011) concluded that the major suggestions given by the cotton growers to overcome the constraints associated with adoption of Integrated Pest Management (IPM) practices in sequential order were: training should be imparted in time (76.67 per cent) followed by Scientific advise should be given in time (74.17 per cent), Low cost plant protection appliances should be provided in time, (72.50 per cent), seeds of Insect and disease resistance should be given at reasonable prices, (69.17 per cent), Necessary information regarding use of bio-agents should be provided, (60.83 per cent), Arrangement for crop loan and insurance should be made (58.33 per cent) and kit and literature regarding IPM should be provided (52.50 per cent). So it is evident from study that the training should be imparted in time,
scientific advice should be given in time were major suggestions offered by cotton growers to overcome the constraints faced by them.

Rajput (2016) reported that the suggestions offered by majority of the respondents were: the technical guidance should be provided regarding assessment of ETL, training on IPM technologies should be imparted, more number of demonstrations on IPM should be organized on farmer’s field and trichoderma should be made available at local market.