CHAPTER II

REVIEW OF LITERATURE

The main purpose of this chapter is to present a comprehensive and critical review of past researches to provide sound basis for scientific investigation. It helps the researcher to develop theoretical framework to delineate the research methodology as well as to operationalize concepts and variables and lends support in the interpretation of the findings.

Few research studies on use of biofertilizers and biopesticides may be conducted so far in Gujarat and India. Hence, attempts have been made to present a brief review of literature related to present study under the following heads.

2.1 Personal, socio-economic, communication and psychological characteristics of the respondents.

2.2 Knowledge level of the respondents about biofertilizers and biopesticides.

2.3 Attitude of the respondents about biofertilizers and biopesticides.

2.4 Relationship between selected characteristics of the respondents and their knowledge level.

2.5 Relationship between selected characteristics of the respondents and their attitude.

2.6 Evaluative perception about use of biofertilizers and biopesticides.

2.7 Constraints perceived by the respondents in use of biofertilizers and biopesticides.

2.8 Suggestions offered by the respondents to overcome constraints in use of ‘Sawaj’ biofertilizers and biopesticides.

2.1 Personal, socio-economic, communication and psychological characteristics of the respondents

2.1.1 Personal characteristics

2.1.1.1 Age

Gohil (2010) observed that about less than half (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. It can be concluded that majority (83.50 per cent) of the
respondents were from middle to old age groups.

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

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

### 2.1.1.2 Education

Kaur and Kalra (2006) reported that 33.33 per cent of the organic farmers had education up to matriculation, followed by 23.34 per cent and 18.33 per cent of them had primary and middle level education. Whereas equal number (10.00 per cent) of the respondents were educated up to senior secondary and graduation level. Rest of the farmers (5.00 per cent) found illiterate.

Patel (2007) revealed that more than two-fifth of agricultural technology about tissue culture adopters (45.00 per cent) had education up to college followed by 41.00 per cent and 14.00 per cent had higher secondary and primary level of education respectively.

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.

Patel (2016) revealed that very few farmers (2.22 per cent) were illiterate, whereas, 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.

### 2.1.2 Socio-economic characteristics

#### 2.1.2.1 Social participation

Gohil (2010) revealed that majority (69.50 per cent) of the respondents of cotton
growers had medium social participation, whereas 16.00 and 14.50 per cent of the respondents had high and low social participation, respectively. It can be concluded that the social participation of majority of the respondents was medium to high (85.50 per cent).

Patel (2012) revealed that majority (70.00 per cent) of organic farmers had medium social participation followed by high social participation (18.00 per cent) and low social participation (12.00 per cent) respectively.

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

Patel (2016) studied that majority (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 03.89 per cent cotton growers were having no membership in any organization.

2.1.2.2 Herd size

Pandya (2011) revealed that the majority of organic farming followers (56.00 per cent) had not possessed any type of animal followed by 17.00, 14.00 and 13.00 per cent of them possessed 1 to 2 animals, above 4 animals and 3 to 4 animals respectively.

Chanpaneri (2012) observed that 63.33 per cent organic farmers possessed medium herd size while, 16.67 per cent organic farmers possessed large herd size respectively. Remaining 20.00 per cent organic farmers possessed small herd size.

2.1.2.3 Land holding

Chanpaneri (2012) revealed that 45.00 per cent and 26.66 per cent of the organic farmers were marginal and small farmers respectively. While 28.34 per cent organic farmers having medium land holding. There was no big farmer.

Patel (2012) observed that 31.00 per cent and 24.00 per cent of the organic farmers were medium and semi medium farmers respectively. The organic farmers with small, large and marginal holding were 20.00 per cent, 16.00 per cent and 09.00 per cent respectively.
Hadiya (2013) observed that about 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.

Patel (2016) reported that 40.00 per cent of the cotton growers of 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), while, 15.00 per cent of the cotton growers of DIS were found having big size of land holding. Only 10.00 per cent of the beneficiary farmers were found having marginal size of land holding.

### 2.1.2.4 Annual income

Kachhiyapatel (2007) reported that more than two-fifth (44.00 per cent) of the technology adopters had high annual income followed by 33.50 per cent and 22.50 per cent possessed medium and low level of annual income respectively.

Prajapati (2008) concluded that nearly half (48.00 per cent) of the respondents had income ranging from ₹ 5001 to ₹ 10000 per annum followed by 32.00 per cent who had income ranging from ₹ 10001 to ₹ 15000. An equal number (8.00 per cent) of each of them had income ranging from ₹ 15001 to ₹ 20000. There were only 4.00 per cent respondents having annual income more than ₹ 20000.

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

Sangada (2015) revealed that 43.33 per cent of the respondents had medium income (₹ 50000 to 100000). About 25.33 per cent of the respondents were from low income group (below ₹ 50, 00) whereas, 30.83 per cent of the respondents were from high income group (Above ₹ 1, 00, 00).

Patel (2016) pointed out that, nearly three fifth (59.45 per cent) of the cotton growers of drip irrigation system had annual income between ₹ 1,50,001 to ₹ 2,50,000 followed by 16.11 per cent cotton growers of drip irrigation system were having annual income between up to ₹ 1,00,000. While, nearly one forth (24.44 per cent) of cotton growers of DIS belonged to annual income above ₹ 2, 50,001/-. 
2.1.2.5 Cropping intensity

Satasiya (2008) indicated that 63.63 per cent of demonstrator farmers had medium cropping intensity and 16.36 per cent had high and 20.00 per cent with low cropping intensity, while 58.18 per cent non-demonstrators farmers were found in medium cropping intensity, while 9.09 per cent of them had low and 32.72 per cent had high cropping intensity, respectively.

Kumbhani (2009) revealed that 65.62 per cent respondents had medium cropping intensity followed by 15.63 and 18.75 per cent respondents with high and low cropping intensity, respectively.

Mavani (2012) showed that 82.50 per cent respondents had medium cropping intensity, followed by 17.50 per cent respondents with high cropping intensity in groundnut.

Markana (2015) revealed that 60.83 per cent respondents had medium cropping intensity, followed by 22.50 and 16.67 per cent respondents were high and low cropping intensity, respectively.

Patel (2016) indicated that equal proportion of (25.00 per cent) of the cotton growers of DIS having cropping intensity between 151 to 175 per cent and 176 to 200 per cent. While, 22.78 per cent cotton growers of DIS had 126 to 150 per cent cropping intensity. Fifteen per cent of cotton growers of DIS having above 200 per cent cropping intensity, whereas, only 12.22 per cent respondents having 100 to 125 per cent cropping intensity.

2.1.2.6 Farm mechanization index

Kher (1986) reported that the mean score of farm mechanization index of the contact and non-contact sugarcane growers was 216.34 and 177.35, respectively.

Khodifad (1993) inferred that majority (69.19 per cent) of the respondents had medium farm mechanization index followed by 16.50 per cent and 14.31 per cent of the respondents who had high and low farm mechanization index respectively.

Patel (1995) indicated that the mean farm mechanization index of demonstrator and non-demonstrator groundnut grower was 62.935 and 60.97 per cent respectively.

Jadav (2001) summarized that majority (41.67 per cent) of onion growers were from medium farm mechanization index group followed by (34.16 per cent) and (24.16 per cent).
per cent) of onion growers were from high and low farm mechanization index group respectively.

Jadav (2005) reported that majority (49.00 per cent) of mango growers group had medium farm mechanization followed by (29 per cent) and (22 per cent) of mango growers were from low and high farm mechanization index group respectively.

2.1.3 Communication characteristics

2.1.3.1 Extension participation

Patel (2004) reported that nearly half (48.40 per cent) of the respondents had medium level of extension participation; where as an equal (25.80 per cent) of the respondents had low and high level of extension participation.

Vasava (2005) reported that more than three fifth of the pigeon pea growers (63.33 per cent) had medium level of extension participation.

Verma (2000) revealed that about three-fourth (73.83 per cent) of the groundnut growers had medium extension participation whereas, 15.63 and 10.54 per cent of the respondents had low and high extension participation, respectively.

Kamani (2007) revealed that 74.28 per cent of organic farmers had medium level of extension participation followed by 15.72 and 10.00 per cent of them had high and low level of extension participation, respectively.

Jadeja (2008) revealed that 58.00 per cent of the neem owners had medium extension participation, whereas 23.00 per cent and 19.00 per cent of them had high and low extension participation, respectively.

Kumbhani (2009) indicated that 54.37 per cent of the coriander growers had medium extension participation, whereas 23.76 and 21.87 per cent of them high and low extension participation, respectively.

Dalsaniya (2010) clear that (75.00 per cent) of the sesame growers had medium extension participation, whereas 22.50 and 02.50 per cent of them had low and high extension participation, respectively.

Humbal (2012) clear that 68.33 per cent of the respondents had medium extension participation, whereas 21.67 and 10.00 per cent of them had low and high extension participation, respectively.
Sangada (2015) revealed that 52.50 per cent of respondents had medium extension participation, whereas 25.00 and 20.00 per cent of them had high and low extension participation respectively.

2.1.3.2 Cosmopoliteness

Trivedi (2000) revealed that more than three-fourth (78.00 per cent) of the respondents were found with medium cosmopoliteness, whereas 12.00 per cent and 10.00 per cent of them were found with high and low cosmopolite localite, respectively.

Ghosh (2004) found that more than half (52.00 per cent) of the respondents had medium cosmopoliteness followed by 33.00 per cent and 15.00 per cent of the respondents with high and low cosmopoliteness, respectively.

Bhagat (2005) concluded that cent per cent farmers using indigenous knowledge about neem for health and other purposes had high level of cosmopoliteness.

Patel (2007) observed that nearly three fourth (73.00 per cent) of banana growers had medium level of cosmopoliteness, While 19.67 per cent and 07.33 per cent of them had low and high level of cosmopolitans, respectively.

Sharma (2008) indicated that more than two-third (70.83 per cent) of the papaya growers had medium level of cosmopoliteness, followed by 20.00 per cent had high and 9.17 per cent had low cosmopoliteness, respectively.

2.1.4 Psychological characteristics

2.1.4.1 Innovativeness

Chavda (2005) concluded that majority (84.66 per cent) of the Bt. cotton growers had medium innovativeness followed by 8.67 per cent and 6.67 per cent who had high and low level of 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. Thus, about three-fourth of the respondents had low to medium innovativeness and near about one fourth (23.00 per cent) had high innovativeness.
Patel (2012) revealed that majority (62.00 per cent) of the organic farmers had medium innovative proneness followed by 27.00 per cent and 11.00 per cent of them had high and low innovation proneness, respectively.

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.

Hadiya (2013) revealed that 35.00 per cent of the respondents were early majority followed by 22.50 per cent early adopter and 20.00 per cent late majority. Only 17.50 per cent respondents were innovator and remaining 5.00 per cent respondents were laggards.

2.1.4.2 Scientific orientation

Patel (2006) revealed that half of the organic farmers had medium level of scientific orientation, while 47.78 per cent had low scientific orientation. Only 2.22 per cent of them had high level of scientific orientation.

Sangada (2015) indicated that majority (51.67 per cent) of the groundnut growers had medium scientific orientation, followed by 35.00 per cent, and 10.00 per cent and 3.33 per cent had high, very high, very high and low scientific orientation. NO respondent were found under the category of very low.

Patel (2016) reported that around half of the cotton growers of DIS (45.56 per cent) were having medium scientific orientation, followed by high scientific orientation (27.22 per cent) and very high scientific orientation (13.33 per cent), respectively. While 12.78 per cent respondents were having low and 1.11 per cent having very low scientific orientation.

2.2 Knowledge level of the respondents about use of biofertilizers and biopesticides.

Binkadakatti (2008) observed that knowledge level of trained and untrained farmers about bio-fertilizers revealed that, 53.75 per cent of trained and only 17.5 per cent of untrained farmers were belonged to overall high knowledge level category, followed by trained (38.75 per cent) and untrained farmers (26.25 per cent) were in medium knowledge level category, whereas 7.5 per cent of trained and 56.25 per cent of untrained respondents were belonged to low knowledge level category.
Naik et al. (2009) conducted a study on knowledge level about organic farming in Haryana, observed that the knowledge percentage about the use of biofertilizers was also quite high (75.00 per cent) followed by medium level of knowledge (15.00 per cent). While, only (10.00 per cent) respondents belonged to low level of knowledge about use of biofertilizers in organic farming.

Suman (2012) studied on technological knowledge of farmers about the use of bio-fertilizers in kullu, Himachal Pradesh revealed that 35.00 per cent of the respondents showed satisfactory knowledge level about the use of bio-fertilizers. He further noted that half of them (50.00 per cent) respondents showed poor knowledge and rest of them (15.00 per cent) were having good knowledge of bio-fertilizers use.

Deshmukh et al. (2014) revealed that knowledge of the respondents about Neem seed kernel extract (NSKE) is considerably high. More than two thirds (70.83 percent) of the respondents were knowing about Neem seed kernel extract (NSKE), while slightly more than one tenth (12.49 percent) of the respondents knew about trichocard. In case of other biocontrol practices the situation is pathetic. Only 3.33 percent of the cotton growers had knowledge about HaNPV and Chrysoperla, while, 2.49 percent about pheromone traps. As far as knowledge about Bacillus Thuringiensis (B.T.) spray, it is unknown to negligible number of the cotton growers.

2.3 Attitude of the respondents about use of biofertilizers and biopesticides.

Zuntic and Tratnik (2004) focused on the organic agriculture perception of Croatian farmers, particularly their attitude towards organic vegetable growing and their willingness to start with this type of production in the future. The results indicated that attitude of the vegetable growers towards the organic agriculture was positive, much more than the attitude of other farmers. The vegetable growers had clearly shown higher interest in organic agriculture and firmer conviction about the future perspective of organic agriculture in Croatia.

Chanpaneri (2012) indicate that two fifth (60.00 per cent) of tribal organic farmers had moderately favourable attitude, 23.33 per cent of the respondents had less favourable and remaining 16.67 per cent of the respondents had highly favourable attitude towards organic farming.

Patel (2012) indicate that majority (62.00 per cent) organic farmers had moderately favourable attitude. While 34.00 per cent of the respondents had high and
rest 4.00 per cent of them had less favourable attitude towards organic farming practices respectively.

2.4 Relationship between selected characteristics of the respondents and their knowledge level.

2.4.1 Age and knowledge level

Binkadakatti (2008) studied on impact of Krishi Vigyan Kendra trainings on use of bio-fertilizers and bio-pesticides and observed that the association between knowledge and age was found non-significant.

Suman (2012) conducted a study on technological knowledge of farmers about the use of bio-fertilizers and revealed that there was a negative and significant relationship between knowledge level and age of the respondents.

2.4.2 Education and knowledge level

Binkadakatti (2008) observed that there was a positive and significant relationship between knowledge level of bio fertilizer and biopesticide user trained and untrained farmers with education.

Suman (2012) revealed that there was a negative and significant relationship between knowledge level and education of biofertilizer user farms.

2.4.3 Social participation and knowledge level

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

Tarde and Thorat (2006) found that social participation did not have any significant association with their knowledge about pomegranate cultivation.

Kumar (2012) observed that social participation had positive and significant relationship with knowledge about recommended production technology of brinjal.

Humbal (2012) observed that there was positive and significant relationship between knowledge of respondents about recommended crop production technology of castor as intercrop with groundnut and their social participation.
2.4.4 Herd size and knowledge level

Binkadakatti (2008) reported that there was a positive and significant relationship between knowledge level of biofertilizer and biopesticide user trained and untrained farmers with herd size.

Suman (2012) found that there was a positive and significant relationship between knowledge level and herd size of biofertilizer user farmers.

2.4.5 Land holding and knowledge level

Binkadakatti (2008) observed that there was a positive and significant relationship between knowledge level of trained and untrained farmers with land holding.

Suman (2012) revealed that there was a positive and highly significant relationship between knowledge level and land holding.

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.

2.4.6 Annual income and knowledge level

Suman (2012) found that there was a negative and significant relationship between knowledge level and annual income of biofertilizer user farmers.

Humbal (2012) reported that there was positive and non-significant relationship between knowledge and their annual income. It means knowledge of respondents was not related with annual income of the respondents.

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

2.4.7 Cropping intensity and Knowledge level

Chavda (2005) pointed out that there was positive and significant association between knowledge of Bt. cotton growers and their cropping intensity.
Tavethiya (2006) concluded that there was association between cumin crop intensity and knowledge of recommended cumin technology of respondent.

Satasiya (2008) studied that there was positive and significant association between crop intensity and knowledge of demonstrator farmers.

Dalsaniya (2010) pointed out that there was significant association between sesame cropping intensity and knowledge of recommended sesame technology.

### 2.4.8 Farm mechanization index and knowledge level

Jadav (2001) summarized that there was positive and highly significant association between farm mechanization index and knowledge of recommended onion growing practices.

### 2.4.9 Extension participation and knowledge level

Sahoo (2004) revealed that there was highly significant relationship between level of knowledge of the respondents and their extension participation.

Jadeja (2008) inferred that there was positive and significant association between the farmers’ extent of knowledge about use of different parts of neem and their extension participation.

Satasiya (2008) reported that there was a positive and significant association between the knowledge of the respondents about castor production technology and their extension participation.

Chander et al. (2009) found that extension participation was significantly related with the knowledge level.

Dalsaniya (2010) indicated that extension participation was highly dependent on knowledge about recommended kharif sesame production technology.

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 extension participation the respondents.

Hadiya (2013) studied that these was positive and highly significant relationship between the knowledge of recommended practices of kharif groundnut and extension participation of the respondents.
2.4.10 Cosmopoliteness and knowledge level

Sanjay Kumar (2006) reported that positive and significant relationship was found between knowledge level of trained tomato growers with cosmopoliteness further non-significant relationship was found between knowledge level of untrained tomato growers with cosmopoliteness.

Suman (2012) found that the association between knowledge and cosmopoliteness of biofertilizer and biopesticide user farmers was non-significant.

2.4.11 Innovativeness and knowledge level

Kumar (2006) recorded that there was a positive and significant relationship between knowledge level of trained tomato growers with innovation proneness and non-significant relationship between knowledge level of untrained tomato growers with innovation proneness.

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.

2.4.12 Scientific orientation and knowledge level

Kumar (2006) found that there is a positive and significant relationship between knowledge level of trained tomato growers. While, there was not significant relationship between knowledge level of untrained tomato growers with scientific orientation.

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

Suman (2012) revealed that there was a negative and significant relationship between knowledge level and scientific orientation of biofertilizer users.
2.5 Relationship between selected characteristics of the respondents and their attitude.

2.5.1 Age and attitude

Patel (2005) conducted a study on knowledge and attitude of farmers towards organic farming practices indicated that there was negative and significant association between level of attitude of the respondents toward organic farming practices and their age.

Sharnagat (2008) reported that age of the beneficiaries was found to be positive and non-significant with their attitude towards National Horticulture Mission.

Darandale (2010) carried out a study on attitude of tribal farmers towards organic farming practices in maize crop reported that age of tribal maize growers had negative and non-significant correlated with their attitude towards organic farming practices in maize crop.

2.5.2 Education and attitude

Patel (2005) indicated that there was positive and significant correlation between attitude of the respondents and their education of organic farmers.

Darandale (2010) found that attitude towards organic farming practices in maize crop had highly significant relationship with education. It means with increase in education level attitude level towards organic farming also increased.

2.5.3 Social participation and attitude

Patel (2005) observed that positive and significant association was found between attitude of respondent towards organic farming practices and their social participation.

Shingare (2005) found a non-significant relationship between social participation of farmer and their attitude towards the veterinary science.

2.5.4 Herd size and attitude

Darandale (2010) indicated that herd size was highly and significantly correlated with attitude towards organic farming practices in maize crop.

Patel (2012) studied on attributes encouraging organic farming reported that herd size was found significantly related with the attitude of the respondents.
2.5.5 Land holding and attitude

Patel (2012) indicated that land holding was found to have significant relation with the attitude of the respondents of organic farmers.

Sharnagat (2008) reported that land holding of the beneficiaries had significant relationship with attitude of the respondents towards National Horticulture Mission.

2.5.6 Annual income and attitude

Darandale (2010) reported that annual income had positive and significant relationship with attitude of organic farmers.

Patel (2012) stated that the annual income was found significantly correlated with the attitude of the respondents of organic farmers.

2.5.7 Cropping intensity and Attitude

Shankaraiah and Narayana Swamy (2012) carried out study about Attitude of farmers and scientists towards dissemination of technologies through Mobile Message Service (MMS). They reviled that cropping intensity had positively and significant relation with attitude towards Mobile Message Service (MMS).

Prajapati and Sharma (2017) studied that farmers had positive and nonsignificant relationship between cropping intensity and attitude toward organic farming.

2.5.8 Farm mechanization index and Attitude

Akila and Chander (2009) study found that majority of the farmers (89.00 per cent) had favourable attitude towards utilisation of draught bullocks and the farmers by and large still depend on bullocks for certain farm operations and they strongly believe that nothing could replace the performance of the bullocks.

Mohamed (2014) submitted a report titled mechanization in paddy cultivation: attitude of labours, farmers and unions. According to report majority of farmers had positive attitude towards farm mechanization.

Sharma (2016) carried out study about farmer’s attitude towards modern farm mechanization, in this study he reviled that majority of farmers (62.50 per cent) had neutral attitude towards modern farm mechanization. Followed by 20.00 per cent of
farmers had favourable attitude towards modern farm mechanization. While 17.50 per cent of the farmers had unfavourable attitude towards modern farm mechanization.

Sahana et al. (2017) carried out the study on adoption and attitude of farmers on mechanization of Paddy was conducted in command areas of Karnataka state. The data with respect to attitude of farmers towards farm mechanization practices indicated that that nearly equal number of farmers had most favourable (36.11 per cent) and least favourable (35.56 per cent) attitude towards farm mechanization in Paddy cultivation. While 28.33 per cent of the farmers had favourable attitude towards farm mechanization. Most of the farmers have most favourable (36.11 per cent) attitude towards farm mechanization.

### 2.5.9 Extension participation and Attitude

Patel (2005) reported that extension participation had positively and highly significant relationship with attitude about organic farming practices.

Chavda (2005) concluded that extension participation had significant relationship with their attitude about Bt. cotton growers.

Kamani (2007) found that extension participation had positive and highly significant in relationship with attitude towards organic farming practices.

### 2.5.10 Cosmopoliteness and attitude

Chauhan (1994) revealed that cosmopoliteness had positively and significant relation with attitude towards modern agriculture practices.

Darandale (2010) indicated that cosmopoliteness had positive and significant relationship with the attitude towards organic farming practices in maize crop.

### 2.5.11 Innovativeness and attitude

Patel (2012) in his study observed that innovation proneness had positive and significant relationship with attitude of the respondents.

### 2.5.12 scientific orientation and attitude

Awasthi et al. (2000) found that there was significant relationship between scientific orientation and attitude towards improved dairy practices.
Darandale (2010) indicated that scientific orientation had positive and significant relationship with the attitude.

2.6 Evaluative perception

Patel (2005) stated that the majority of the farmers (55.00 per cent) fell in the medium perception category followed by high (24.00 per cent) and low (21.00 per cent) perception category respectively.

Sonwane et al. (2015) revealed that 59.16 per cent of the respondents have low perception towards crop insurance scheme. Low perception followed by medium perception (30.84 per cent) and high perception (10.00 percent).

2.7 Constraints perceived by the respondents in use of biofertilizers and biopesticides.

Bhople and Borkar (2002) studied constraints encountered by the users of biofertilizers and revealed that 51.33 per cent of the farmers faced the problem of non-availability of bio fertilizers at nearby place.

Nirmala et al. (2002) studied constraints in adoption of biofertilizers and observed that inadequate water availability at time of application of biofertilizers was important constraints reported by more than two thirds of respondents (79.16 per cent). The next constraint expressed was inability to plan in advance as reported by 64.16 percent of the respondents. The other constraints like lack of reinforcement upon the technology, not able to remember the quantity and delayed land preparation was reported by 34.16 per cent, 40.00 per cent and 30.00 per cent respectively.

Binkadakatti (2008) reported that important constraint faced by the untrained farmers in use of biofertilizers and bio-pesticides were; lack of knowledge about dosage of bio-fertilizers and bio-pesticides (96.25 per cent), lack of guidelines about seed treatment (92.50 per cent). Further constraints faced by untrained farmers were; non-availability of bio-fertilizers and bio-pesticides at appropriate time (87.50 per cent), non-availability of bio-fertilizers and bio-pesticides in nearby market (87.50 per cent) and lack of extension participation and non-availability of raw material for preparation of Nuclear Polyhedrosis Virus, Neem Seed Kernel Extract and bio-digester solutions (62.50 per cent). On the other hand less important constraint faced by the trained farmers in use of biofertilizers and bio-pesticides were; lack of knowledge about dosage of bio-fertilizers and bio-pesticides (50.00 per cent), non-availability of bio-fertilizers and bio-pesticides at appropriate time (45.00 per cent), lack of guidelines about seed
treatment (40.00 per cent). Further constraints; lack of extension participation and non-availability of raw material for preparation of NPV, NSKE and bio-digester solutions (35.00 per cent) and non-availability of bio-fertilizers and bio-pesticides in nearby market (31.25 per cent) were not important respectively.

Chanpaneri (2012) revealed that lack of information about organic farming (60.83 per cent), difficult to control disease, pest & weeds (58.33 per cent), inadequate availability of organic inputs (56.66 per cent), difficult to convince family members (54.16 per cent) and lack of assured marketing network (51.66 per cent) were the important constraints as reported by the farmers and ranked first, second, third, fourth and fifth respectively. Other constraints were; less yield in initial year (49.16 per cent), no price premium in local market (46.66 per cent), small & fragmented holding (45.00 per cent), negative attitude of neighboring farmers (42.50 per cent), difficult to maintain farm records (39.16 per cent) and inadequate transport facility (28.34 per cent) as order of importance.

Srinivas and Bhalekar (2012) studied constraints faced by farmers in adoption of biofertilizers and revealed that a great majority of respondents (85.00 per cent) reported the lack of confidence towards various biofertilizers practices, followed by lack of knowledge about biofertilizers (58.00 per cent), inadequate water availability (45.00 per cent) and lack of guidance from extension personnel (41.00 per cent) were the major constraints as reported by the respondents.

2.8 Suggestions offered by the respondents to overcome constraints in use of ‘sawaj’ biofertilizers and biopesticides.

Christian (2001) revealed that major suggestions given by the cotton growers in descending order were training should be available in time (78.56 per cent), followed by training should be imparted to agricultural laborers on spraying/dusting or using bio-agents (72.00 per cent) and quality of plant protection appliances and bio-agents should be maintained (66.38 per cent).

Rajesh (2011) has developed a scale to measure attitude of the farmers towards bio-control measures of plant protection. In this study majority of the respondents suggested that; Quality of the bio-control agents should be standardized (80.00 per cent), followed by farmers should be trained about production and usage of the biocontrol agents (77.15 per cent), campaigns to create awareness among the farming community should be organized (64.77 per cent) and bio-control agents should be made available to all the needy farmers (60.00 per cent).