CHAPTER V

SUMMARY, FINDING AND CONCLUSION

Agriculture production is a function of different factor such as land, labour, entrepreneurship, credit, seeds, fertilizers and good climate. However, adoption of improved production technology on the part of farmers is one of the important factors in boosting agriculture production.

Aggregatum onion (*Allium cepa* L. var. *aggregatum* Don.) is one of the most important vegetable crops grown on fairly larger area in Tamilnadu for local consumption and for the export purpose also.

There is a well developed technology to improve the production and quality of onion available with Tamilandu Agricultural University (TNAU), Directorate of Onion Garlic Research (ICAR) and National Horticultural Research and Development Foundation. The adoption of this technology to the maximum extent will maximize the production of onion. However, farmers observed and had adopted the technology partially. Therefore there was need to know to what extent their level of awareness, knowledge and adoption and constraints faced by them.

The findings of this investigation will be helpful to the planners, organizers, administrators and the extension functionaries in disseminating the onion production technologies for adoption. With premises the present investigation entitled “Adoption of Improved Production Technologies in Seed Propagated Aggregatum Onion - An Exploratory Study in Tiruppur District of Tamil Nadu” was conducted with the following specific objectives
Objectives

**The specific objectives of the study are**

1. To study the socio economic profile of the seed propagated aggregatum onion growers in the study area
2. To examine the awareness and knowledge level of the onion growers on improved production technologies of seed propagated aggregatum onion
3. To assess the extent of adoption of production technologies followed by seed propagated aggregatum onion growers
4. To examine the association between the level of awareness, knowledge and adoption on improved production technologies of seed propagated aggregatum onion and socio economic variables of the onion growers
5. To find out the constraints faced by the growers of seed propagated aggregatum onion in adoption of production technologies
6. To suggest appropriate policies and strategies needed for improving the adoption of production technologies of seed propagated aggregatum onion

The 360 seed propagated aggregatum onion growers from 36 villages of selected six blocks in Tiruppur district were selected for the study. The statistical tools and techniques used were percentage and correlation co-efficient \( r \) to test the relationship between the characteristics of onion growers with their level of adoption of improved production technologies of seed propagated aggregatum onion.

For any study, findings are very important. The major findings have been drawn from the discussion and analysis of the research study which are hereunder.
Salient findings

5.1. Profile of the respondents of seed propagated aggregatum onion growers of Tiruppur district

5.1.1. Age

- The majority (58.60%) of the total respondents belonged to old age group category followed by 30.30 percent of the respondents belonged to middle age group.
- Only 11.10 percent of the respondents belonged to the age category of young.
- The finding concludes that old age growers were progressively involved in onion cultivation than middle and young age farmers. The reason may be that the youths are either studying or employed.

5.1.2 Educational status

- The majority (28.30%) of the respondents had secondary education level followed by collegiate education (23.60%), higher secondary level (15.30%), and middle level education (12.50%) primary level (11.10%) and 5.00 percent of the respondents were functionally literate.
- Only 4.20 percent of the respondents were illiterate.
- The reason behind their literacy level from primary to higher secondary (67.20%) may be that most of the villages in the study area had sufficient number of elementary, secondary and higher secondary schools. The graduated respondents got their diploma or degree in nearby towns such as Tiruppur, Coimbatore, Udumalpet and Palani. The illiterate mostly belonged to the old age category.
5.1.3. Occupational status

- The study shows that the majority (82.50%) of the respondents were found to be in the farming as their main occupation followed by farming and wage earner (16.40%).

- Very less respondents were involved in business along with farming (0.60%) and farming and services (0.60%) as their occupation.

- It was observed from the findings that the majority of the respondents had farming as their only and main occupation. Some of them were doing as wage earners. The reason may be that farming might be profitable.

5.1.4. Annual income

- The study reveals that nearly half of the respondents (49.40%) possess with high level of income, followed by 41.40 percent with medium level and only 9.20 percent lies with low income category.

- The finding shows that the high level of income may be the reason that their onion harvesting time perfectly matches to the exporting period (April – Aug) of onion, because of which, they get higher prices usually for their onions every year compared to other districts.

5.1.5. Family size

- The study reveals that majority (84.40%) of the respondents belonged to 5- 6 family members category followed by 8.10 percent of the respondents belonged to 4 and below category and 7.50 percent of the respondents belonged to above 6 family members category.

- The study infers that the joint family ratio is higher in this district.
5.1.6. Farming experience

- The 50.28 percent of the respondents possessed more than 20 years of farming experience followed by 31.11 percent had 11-20 years of experience.
- Only 18.61 percent had experience up to 10 years.
- The study further reveals that 80 percent of the respondents had possessed more than 10 years of experience.
- The majority of the respondents had farming as their major occupation and they had practised farming from their early hood itself.

5.1.7. Experience in onion cultivation

- The study shows that majority (73.10%) of the respondents possessed medium level of experience in onion cultivation, followed by 18.30 percent had high level of experience and only 8.60 percent possessed low level experience.
- The longer period of onion cultivation is the main reason for the lengthy experience.

5.1.8. Farm size

- The study observed that more than half (54.70%) of the respondents belonged to the category of small farmers followed by nearly one fourth (26.90%) of the respondents were marginal category.
- Only 18.30 percent of the respondents belonged to the category of big farmers.

5.1.9. Area under onion cultivation

- The study reveals that 36.39 percent of the respondents were growing aggregatum onion in the extent of 1 to 2 acres, followed by 30 percent were 2 to 3 acres and 11.94 percent of the respondents belonged to less than 1 acre category, 14.17 percent growers were 3 to 4 acres category.
- The study further shows that 7.50 percent respondents were cultivating onion in more than 4 acres. The finding of the study reveals that more than half of the respondents (51.67%) had cultivated the onion in more than two acres of land.
5.1.10. Extension agency contact

- The study shows that 82.22 percent of the respondents were taking guidance of local agri-input dealers, followed by 19.43 percent of the respondents were contacting the extension workers such as Assistant Agriculture Officer/Assistant Director of Agriculture/Assistant Horticultural Officer/ Horticulture and KVK Scientists.

- Only 8.88 percent of the respondents were contacting the NGOs and other agencies who were working in rural areas.

- The reason for highest percentage of contact with local input dealers is that they were locally and easily accessible from early morning to late evening.

5.1.11. Farm power possession

- The study stated that more than half of the total respondents (59.70%) were in medium level of farm power possession category, followed by 21.10 percent were low and 19.20 percent of the respondents were in high level category of farm power possession.

- The reason may be that most of the farmers were having farm implements such as sprayer, disk plough, tractors and trailor and oil engine for their farm management operation.

5.1.12. Livestock possession

- The study reveals that 64.17 percent of the farmers had possessed the low level of cow possession followed by 25.56 percent had medium and only 5 percent had high level of cow possession.

- Further study finds that 34.17 percent of the farmers had possessed the low level of goat possession followed by 16.39 percent had medium and 14.17 percent had high level of goat possession.
- Study further reveals that 46.94 percent of the farmers had high level of poultry possession followed by 40.83 percent had medium level and only 10 percent had the low level.

- The study reveals that the majority (64.17%) farmers had cows for the purpose of milk production so as to have additional income.

5.1.13. Social participation

- The study reveals that more than half of the respondents (51.57%) were as enrolled as member in one organization, followed by 17.22 percent having membership in more than one organization.

- Only 11.11 percent of the respondents were acting as office bearer in one organization and 8.16 percent of the respondents were having office bearer ship in more than one organization.

- The study further reveals that the majority (67.50%) were having membership in cooperative society followed by 35 percent of the respondents were having membership in farmers’ associations and farmers clubs.

- Only 3.33 percent of the respondents were having membership in NGOs.

- Thus, in total 69.20 percent of the respondents had medium level of social participation followed by 19.10 percent as high level and only 11.20 percent of the respondents had low level of social participation.

- The study shows that the respondents were interested in becoming member with cooperative societies as there was provision of credit facilities followed by 31.66 percent level of participation were observed with parent teacher association since their children were studying in the school.
• The major irrigation source in this area is canal water from Parambikulam Aliyar Project and therefore 53.61 percent of the respondents joined as membership in water users association.

5.1.14. Mass media exposure

• The study shows that the majority (68.61%) of the respondents had medium level of mass media exposures, followed by high level (19.72%) of media exposure and low level (11.67%) respectively.

• The medium level of the respondents may have the habit of reading newspaper and watching television daily. Apart from reading of the magazines, they participate in the trainings and meetings related to agriculture. This helped them to interact with mass media.

• The uneducated respondents had low level of exposures because of their reading inability and one-fifth of respondents had high level exposures because of two major corporations (Tiruppur and Coimbatore) made them more exposures to get the leading journals and made possible to attend the seminar or exhibitions which were being organized in this downs.

5.1.15. Credit orientation

• The majorities (51.40%) of the respondents were in medium level and 30.80 percent had high level of credit orientation.

• Only 17.80 percent of the respondents had low level of credit orientation.

• The general observation is that the respondents got credit facilities equally from formal and informal sources of finance, such as banks as well as private money lenders.
5.1.16. Economic motivation

- The study found that 47.50 percent of the respondents had medium level of economic motivation followed by 31.40 percent had high level and 21.10 percent of respondents had low level.

- The economic motivation of medium and high level constitutes 78.90 percent of the respondents which showed that the majority had interest to earn the money and may be the reason which motivated them to go for high income crops such as onion.

5.1.17. Innovativeness

- The study reveals that more than half of the respondents (52.20%) had high level of innovative behavior and 26.70 percent of respondents had medium level.

- Whereas 21.10 percent of the respondents had low level of innovative thinking to adopt new techniques or technologies in their farm.

- The reason for the high level of innovativeness, might be that the study area is located near cosmopolitan cities of Tiruppur and Coimbatore where the standard of living is high, makes the respondents to compete for better standard of living, which might have influenced the level of innovativeness.

- The study shows that the increased level of science and technology developments in the district for other industrial purposes makes them more innovative.

5.1.18. Scientific orientation

- As a whole, half (50.80%) of the total respondents had medium level of behavior on scientific orientation followed by 30.60 percent high level and only 18.60 percent of the respondents had low level of scientific oriented behavior.
• Since it is the potential area for growing of horticultural crops particularly vegetables and favorable prevailing climatic conditions attracted many private seed and pesticide companies, agricultural department functionaries to conduct their field level trails and demonstrations had motivated them to have scientific orientation.

5.1.19. Risk orientation

• The majority (42.20%) of respondents belonged to high level of risk orientation followed by 35.60 percent belonged to the medium level.

• Whereas only 22.20 percent of the respondents belonged to the low level of risk orientation.

• High level of risk orientation behavior which was a good sign to introduce new proved technologies in the study area. This might be due to the reason that onion crop reaps better revenue at the times of harvest.

• Since the respondents have fertile lands with good water sources and better weather conditions prevails during the summer (May – July) because of South-West monsoon made them agriculture as highly profitable venture. This prevailing situation influenced the respondents to have risk orientation.

5.1.20. Market orientation

• The study found that 53.89 percent of the total respondents had medium level behavior of market orientation followed by 21.94 percent of the respondents had high level and 24.17 percent of the respondents had low level.

• The study reveals that the marketing of the onion were taken by the majority of the farmers with local merchants.

• Only one-fifth of the respondents had high level of market orientation. They were following the price forecasting services and gathering from other major market price before them selling the product.
5.1.21. Trainings undergone

- The study shows that the majority of the respondents (54.16%) had not attended any specific training on seed propagated aggregatum onion.
- However 33.89 percent of the respondents had the medium level of training undergone category followed by 11.38 percent had high level.
- The reason for medium level of trainings undergone may be that their busy schedule on the other continuous farming activities did not allow them to participate the trainings.

5.2. Findings on the awareness level

On the awareness level, 37 technologies were tested and findings are presented below. The awareness level was high (above 70%) in some technologies, medium (40-70%) and low (below 40%) in some technologies.

In the following technologies farmers had high level of awareness (above 70%).

1. Season (99.20%)
2. Varieties (98.90%)
3. Army worms damage (98.10%)
4. Application time of weedicides (96.10%)
5. Name of recommended weedicides (94.20%)
6. Spacing (92.22%)
7. Seed rate per acre (91.10%)
8. Age of seedling (90.60%)
9. Drip irrigation system (88.10%)
10. Field preparation (85.80%)
11. Thrips damage (85.80%)
12. Sorting and grading (84.70%)
13. Soil type (83.30%)
14. Damping off disease (76.10 %)
15. Suitable bed type for nursery (72.20%)
• The majority (99.20%) respondents in Tiruppur district were well aware of sowing and harvesting periods of this crop through their lengthy and rich experience.
• The farmers possessed high level of awareness (98.90%) of the varieties of seed propagated aggregatum onion since only two varieties were available.
• The majority (98.10%) of the farmers were aware of army worm damage. The reason for the high level of awareness could be that big holes and faecal matter were visible on the leaf.
• The majority (96.10%) of the respondents were aware of time of weedicide application.
• The majority (94.20%) were aware of recommended weedicide name for seed propagated aggregatum onion. The necessity of the this technology made them more of awareness
• The majority (92.22%) of the respondents were aware of spacing requirement for seed propagated aggregatum onion.
• The majority of the farmers (91.10%) were aware of seed rate for seed propagated aggregatum onion. The high level of awareness was because of their experience gained through continuous usage of seeds.
• The majority (90.60%) of the respondents were aware of the exact age of seedling. The reason for high level of awareness is about continuous onion growing experience.
• The study found that the majority (88.10%) of the respondents were aware of drip irrigation system. Its advantages in increasing yield and quality of seed propagated aggregatum onion made them to have more awareness.
• The majority (85.80%) of the respondents were well aware of ploughing requirements for onion cultivation.
• The 85.80 percent of the respondents were aware of symptoms of damages caused by *thrips* in the seed propagated aggregatum onion crop since symptoms could be easily visualize on the leaf surface.
• The majority (84.70%) of the farmers were aware of the methods of sorting and grading procedures. The higher price fetches by graded onions is the reason of high level awareness on this technology.

• The 83.30 percent of the respondents were aware of the soil type and quality requirements for cultivation of onion because of their experience gained through continuous growing of seed propagated aggregatum onion.

• Majority (76.10%) of the respondents were aware damping off disease in the nursery. Easily visualizing the symptoms is the reason for high level of awareness.

• The study reveals that only 72.20 percent farmers were aware of recommended nursery bed type and whereas majority of respondents (27.80%) were unaware about the raised beds. This is because of their non-exposure to this technology.

The medium levels of awareness (between 40-70%) were observed in the few technologies which are presented below.

1. Wetting agent usage (69.70%)
2. Top cutting method (68.60%)
3. Time of application of top dressing (57.80%)
4. Fertilizer management for onion nursery (56.67%)
5. Basal rot disease damage (51.10%)
6. Purple blotch disease damage (50.30%)

• The majority (69.70%) of the respondents were aware of necessity of wetting agent to be mixed with spray solution for onion crop.

• The majority (68.60%) of the farmers were aware of the recommended top cutting method in aggregatum onion. Their prolonged marketing experience of onion makes them to have high awareness level.

• The 57.80 percent of the farmers only were aware of recommended time of application of top dressing fertilizers while others not.
• The majority (56.67%) of the farmers were aware of the manure and fertilizers for onion nursery.

• Only 51.10 percent of the farmers were aware of *basal rot* disease systems.

• Only half of the total respondents (50.30%) were aware of symptoms of *purple blotch* disease.

Further, farmers awareness were observed as low (Below 40%) in the following important technologies.

1. Seed treatment (39.40%)
2. Improved storage godown (33.10%)
3. Time of application of basal fertilizer (29.70%)
4. Leaf miner damage (28.10%)
5. Shade curing (22.50%)
6. ICT services usage (20.60%)
7. *Stemphylium* blight damage (19.20%)
8. Nursery sowing method (13.60%)
9. DEMIC price forecast service (9.20%)
10. Bio fertilizers usage (7.80%)
11. *Trichoderma viridi* usage (7.20%)
12. Windrow method of field curing (3.90%)
13. Recommended dose of FYM/ Chemical fertilizers (3.30%)
14. Micro nutrient requirement (3.10%)
15. Pre harvest spray (2.20%)
16. Root dipping of seedlings (0.80%)

• Only 39.40 percent of respondents were aware of seed treatment technology. The reason for the low awareness level was that they were purchasing the seeds from local input dealers/ Seed vendors and taking the sowing activities immediately.
• Only 33.10 percent of the respondents were aware of improved onion ventilated godowns.

• The study finds that only 29.70 percent of farmers were aware of basal fertilizers and the majorities (70.30%) of the farmers were not aware the time of application and they assume that fertilizer can be applied at any time.

• Only 28.10 percent of the farmers were aware of leaf miner damages since it was difficult to identify.

• Only 22.50 percent of the farmers were aware of shade curing recommendation. The impact of this technology was not realized by them since they market the onion after storing in their field for their limited period (15 - 20 days).

• Only 20.60 percent of total farmers were aware of ICT services extended by various agencies. The education and language are the barriers for accessing such kinds of technologies.

• Nearly 19.20 percent of the farmers were aware of symptoms of *Stemphylium* blight disease.

• The 13.60% percent only were aware of the line sowing method. The reason for the low level of awareness is that neither they exposed to the line sowing nor arranged any demonstration in the study area.

• Only 9.20 percent of the farmers were aware of services of DEMIC while others did not aware of this service. The low level of mass media exposure is the main reason for this low awareness.

• Only 7.80 percent of the farmers were aware of bio-fertilizer recommendation for onion crop since most of them have interest only to apply the chemical fertilizers instead of bio fertilizers.

• Only 7.20 percent of the farmers were aware of *Trichoderma viridi* application to control the damping off and basal rot diseases affecting the onion crop.
• Only 3.90 percent of the farmers were aware of the windrow method of field curing. Very low level of awareness on this technology is the reason that, it was not popularized much among the onion growers.

• Only 3.30 percent of the farmers were aware of recommended quantity of manures and fertilizers to be applied in the main field. The low level of awareness is that they were applying the fertilizers by comparing the neighbouring onion growers.

• Only 3.10 percent of the farmers were aware of micro-nutrient recommendation for the seed propagated aggregatum onion crop. Unawareness about the micronutrient requirement is the main reason for low level of adoption.

• Only 2.20 percent of the farmers were aware of pre-harvest spray recommendation while others do not. The very low of awareness on this technology is that maximum farmers did not have much awareness on post harvest technology.

• Only 0.80 percent of the farmers were aware of root dipping of onion seedlings before transplanting. The low level of awareness is that extension agencies were not popularized this technology.

5.3. Findings on knowledge level

The high levels of knowledge (above 70%) were observed only in the following one technology.

1. Recommended season (95.30%)

• The majority (95.30%) of the farmers knew about the suitable season for seed propagated aggregatum onion and 3.90 percent partially knew. Negligible (0.80%) of the farmers had not known.

The study finds that the respondents had medium (between 40-70%) level of knowledge on the following eight technologies.
1. Suitable soil type (69.20%)
2. Sorting and grading (56.70%)
3. Recommended dose of fertilizer for onion nursery (51.70%)
4. Spacing (48.60%)
5. Market glut period for aggregatum onion (48.10%)
6. Drip irrigation system (43.90%)
7. Thrips control measures (43.60%)
8. Genetical characters of Co-On-5 variety (43.30%)

- The majority (69.20%) of the farmers knew about the suitable soil type for seed propagated aggregatum onion cultivation followed by 6.70 percent of the farmers partially knew and 24.20 percent of the farmers had not known.
- The necessity of sorting and grading procedures were known by 56.70 percent of the farmers followed by 25.30 percent of the farmers partially knew and 18.10 percent had not known.
- The 51.70 percent of the farmers knew about the recommended dosage of manures and fertilizers for onion nursery followed by 19.40 percent of the farmers partially knew and 28.90 percent of the farmers had not known.
- Nearly half (48.60%) of the farmers knew about the spacing requirement for seed propagated aggregatum onion followed by 40.00 percent partially knew and only 11.40 percent of the farmers had not known.
- Nearly half (48.10%) of the farmers knew about the market glut period of aggregatum onion and followed by 30.20 percent partially knew and only 21.70 percent of the farmers had not known.
- The 43.90 percent of the farmers knew about the impact of the drip irrigation system in onion cultivation followed by 36.10 percent partially knew and 20 percent had not known.
- The control measures for thrips were well known by 43.60 percent farmers followed by 51.70 percent farmers partially knew and 4.70 percent were not known.
The 43.30 percent of the farmers knew about the varietal character of Co-On-5 variety and 27.20 percent of the farmers had partially known and 29.40 percent of the respondent had not known.

The knowledge level was found as low (below 40%) and the details are given below.

1. Suitable bed size (38.60%)
2. Impact of using under and over aged seedling (38.05%)
3. Basal rot control measures (35.00%)
4. Field preparation (35.00%)
5. Purple blotch control measures (33.30%)
6. Recommended dosage of weedicide (30.30%)
7. Impact of weedicide application (25.00%)
8. Improved storage godown (24.20%)
9. Army worms control measures (23.62%)
10. Control measures for damping off disease (16.40%)
11. Stemphylium blight control measures (16.10%)
12. Advantage of ICT services (13.10%)
13. Minimum germination percentage requirement for onion (11.40%)
14. Dosage of wetting agent (10.80%)
15. Seed treatment chemicals (8.10%)
16. Advantages of line sowing method in nursery (7.80%)
17. Advantages of top cutting method (7.80%)
18. Advantages of shade curing (7.50%)
19. Control measures of leaf miner (5.00%)
20. Dosage of Trichoderma viridi (3.90%)
21. Recommended dosage of FYM/ Chemical fertilizers (3.30%)
22. Recommended quantity of basal fertilizer (2.80%)
23. Essential micronutrients for onion (2.80%)
24. Purpose of windrow method of field curing (2.80%)
25. Recommended dosage of top dressing (2.50%)
26. Dosage of recommended bio-Fertilizers (1.10%)
27. Recommended chemicals for root dipping of seedlings (0.80%)
28. Recommended chemicals for pre harvest spray (0.80%)

- The 38.60 percent of the farmers knew about the recommended bed size for onion nursery followed by 30.60 percent partially knew and 30.80 percent of the farmers had not known.
- The majority (38.05%) of the farmers knew about the impact of using the right stage of seedlings followed by 54.17 percent partially knew and only 7.78 percent of the farmers had not known.
- The control measures for *basal rot* were known by 35 percent of the farmers the followed by 13.90 percent of the farmers partially knew and the majority (51.90%) of the farmers had not known.
- The study reveals that 35 percent of the farmers knew about the impact of recommended number of ploughings for cultivation of seed propagated *aggregatum onion* and followed by 38.90 percent of the farmers partially knew and 26.10 percent of the farmers had not known.
- The study finds that only 33.30 percent of the farmers knew about the controlling measures for *purple blotch* disease and 13.60 percent farmers partially knew and 53.10 percent of the farmers had not known.
- The recommended dosage of weedicide for onion crop was well known by 30.30 percent of the farmers followed by 48.90 percent partially knew and only 20.80 percent of the farmers had not known.
- The time of weedicide application was well known by 25 percent of the farmers followed by 57.20 percent partially knew and only 17.80 percent of the farmers had not known.
- Only 24.20 percent of the farmers knew about the advantages of improved onion ventilated godown followed by 7.20 percent of the farmers partially knew and the majority (68.60%) of the farmers had not known.
The study shows that the control measures for army worms were well known by 23.62 percent of the farmers followed by 50.27 percent partially knew and 26.11 percent had not known.

The 16.40 percent of the farmers knew about the controlling measures for damping off and followed by 23.70 percent partially knew and the majority (53.90%) of the farmers had not known.

The study shows that only 16.10 percent of the farmers knew about the control measures for *stemphylium blight* disease followed by 0.60 percent of the farmers partially knew and the majority (83.30%) of the farmers had not known.

Only 13.10 percent of the farmers knew about the advantages of ICT usages followed by 7.50 percent had partial knowledge and majority (79.40%) of the farmers had not known.

Only 11.40 percent of the farmers knew about the minimum germination percentage requirement for onion seeds and the majority (88.60%) of the farmers had not known.

The dosages of wetting agent was well known by only 10.80 percent followed by 57.80 percent partially knew and 31.40 percent had not known.

Only 8.10 percent of the farmers knew about the recommended chemicals for seed treatment followed by 23.30 percent of the farmers partially knew and that majority (68.60%) of the respondents had not known.

The advantages of line sowing method of onion nursery were known by less than 7.80 percent of the farmers.

The advantages of recommended top cutting procedures were well known by only 7.80 percent of the farmers followed by 28.10 percent partially knew and 64.20 percent had not known.

Only 7.50 percent of the farmers knew about the impact of shade curing on the quality of bulbs followed 13.60 percent partially knew and the majority (78.90%) of the farmers had not known.
• The control measures for leaf miner were well known by 5 percent of the farmers followed by 40.60 percent of the farmers partially knew and 54.40 percent of the farmers had not known.

• The study reveals that only very less 3.90 percent farmers knew about the recommended dosage of *Trichoderma viridi* for onion followed by 0.66 percent partially knew and the majority (95.60%) of the respondents had not known.

• The recommended dose of manures and fertilizers were well known by 3.30 percent of the farmers followed by 96.70 percent were not known.

• The recommended quantity of basal fertilizers were well known by 2.80 percent of the farmers and 96.70% were not known.

• The name of essential micronutrient recommendation for onion crop was well known by only 2.80 percent of the farmers followed by 0.60 percent of farmers partially knew and the majority (96.60%) of farmers had not known.

• The purpose of windrow method of field curing was not known by majority (96.70%) of the farmers followed by only 2.80 percent of the farmers knew well and followed by 0.60 percent partially knew.

• The study reveals that only 2.50 percent of the farmers knew the top dressing dosage followed by negligible (0.80 %) partially knew and the majority (96.70%) had not known.

• The name and quantity of recommended bio fertilizers were well known by only 1.10 percent of the respondents followed by 2.50 percent of the respondents partially knew and the majority (96.40%) of the farmers had not known.

• Negligible (0.80%) farmers knew the names of recommended chemicals for pre harvest spray followed by only 0.30 percent farmers partially knew and the majority (98.90%) of the farmers had not known.

• The recommended chemicals for root dipping for onion seedlings were well known only by negligible (0.80 %) of the respondents and rest 99.20% were not known about the technology.
5.4. Findings on adoption level

The study finding reveals that the respondents had high level (above 70%) of adoption in the technologies such as season, varieties, seed rate, field preparation etc, and the details are presented below.

1. Varieties (95.60%)
2. Season (92.50%)
3. Seed rate per acre (89.70%)
4. Age of seedling (86.40%)
5. Field preparation (79.40%)
6. Seed treatment (78.90%)
7. Recommended weedicide (78.90%)
8. Weedicide application time (78.10%)
9. Suitable soil (73.90%)
10. Fertilizer management for onion nursery (70.00%)

- The majority (95.60%) of the farmers adopted the improved variety of seed propagated aggregatum onion and 4.40 percent farmers did not adopt. The non adopters used the local variety “Gnanamedu” because some local vendors supplied the seeds directly to the farmers at lower price.
- The seed propagated aggregatum onion was cultivated in recommended season by 92.50% of the farmers and only 7.50 percent of the respondents had little deviation from the season. The reason for non adoption was that they set their harvesting period either early or late before normal harvesting period so as to get early bird advantage.
- The recommended seed rate per acre was adopted by 89.70 percent farmers and rest 10.30 percent farmers used the seeds to little higher than the recommended seed rate. The reason behind is that farmers are still buying the seeds from local seed vendors who had not maintained the germination percentage at minimum required level.
• The majority (86.40%) of the farmers used the seedlings at right stage and only 13.60 percent farmers used the over aged seedlings due to delay in field preparation labour shortage.

• The majority (79.40%) of the farmers adopted the recommended number of ploughings and 20.60 percent farmers did not adopt the required number of ploughings. The reason may be that they may not aware of the impact of ploughings in seed propagated aggregatum onion.

• The majority (78.90%) adopted the treated seeds and 21.10 percent farmers did not adopt the treated seeds for their sowing. The reason for usage of non treated seeds is that many local seed producers were selling the seeds without taking seed treatment.

• The majority of (78.90%) farmers adopted the right dosage of recommended weedicides and remaining 21.10 percent did not adopt. The reason of the low level of non-adoption reveals that they were using higher dosage of weedicides.

• The study reveals that 78.10 percent of farmers adopted the exact time of application of weedicide and 21.90 percent farmers did not follow the exact time of application. Non- availability of spray man and forced them in delay of spraying of weedicide application.

• The cultivation of seed propagated aggregatum onion was adopted in the suitable soil type by 73.90 percent of farmers and 26.10 percent did not adopt the exact soil type. Spreading over alluvial or red loamy type soils in Tiruppur district may be the reason for the high level adoption.

• The majority (70.00%) farmers adopted the application of recommended manures and fertilizers in the nursery beds and 30.00 percent did not adopt.
The medium levels (between 40-70%) of adoption were observed in the following technologies.

1. Spacing (68.90%)
2. _Thrips_ control (68.60%)
3. Army worms control (63.10%)
4. Wetting Agent (63.10%)
5. Sorting and grading (60.00%)
6. _Basal rot_ control (46.90%)

- The 68.90 percent farmers adopted the recommended spacing and rest 31.10 percent did not adopt. The reason for non adoption is that they were engaging the contract labourers for bed preparation work on contract basis and they did not take the care on gap between two ridges which resulted reduction in population.

- More than half (68.60%) of the farmers adopted the recommended control measures of thrips and 31.40 percent did not adopt and they used un recommended chemicals. The reason is that the input dealers plays major role in deciding the plant protection chemicals.

- The study reveals that 63.10 percent of total farmers used the recommended chemicals to control the army worm and remaining 36.90 percent did not adopt. The reason for this non adoption of recommended chemicals may be that they used lesser price un recommended chemicals available with dealers.

- The study reveals that 63.10 percent of the farmers used the wetting agent and 36.90 percent of the farmers had not adopted. The reason may be that retail outlets in the rural areas did not encourage the farmers to use the wetting agents.

- The study reveals that 60 percent of the farmers adopted the sorting and grading procedures as per recommendation while 40 percent of the farmers did not adopt. The reason for high level of adoption might be that farmers having adequate knowledge on the advantage of sorting and grading.
- The findings reveals that only 46.90 percent farmers used the recommended chemicals to control the basal rot disease and more than half (53.10%) of the farmers did not use the relevant chemicals with exact dose recommended by SAU/ ICAR institutes.

The study finally reveals that important technologies such as fertilizer management, plant protection management and post harvest management were adopted at low level (below 40%) and findings are presented below.

1. *Purple blotch* control (38.10%)
2. Leaf miner control (36.40%)
3. Drip irrigation system (35.60%)
4. Top cutting method (26.10%)
5. Damping off disease control (25.80%)
6. Shade curing (15.60%)
7. *Stemphylium* blight control (15.00%)
8. ICT - services (7.20%)
9. Top dressing (5.80%)
10. Adoption of DEMIC services (4.40%)
11. Windrow method of field curing (2.80%)
12. Recommended dosage of FYM/ Fertilizers (2.20%)
13. *Trichoderma viridi* usage (2.20%)
14. Recommended nursery bed type (1.67%)
15. Micronutrient (1.90%)
16. Application time of basal fertilizer (1.70%)
17. Bio fertilizers (0.80%)
18. Pre harvest spray (0.60%)
19. Improved storage godown (0.60%) and

   Zero percent adoption was found in the following technologies which are basic requirement in deciding the plant population and also the yield.

20. Line sowing method in onion nursery (0.00%)
21. Root dipping of seedlings (0.00%)
The 38.10 percent farmers used recommended chemicals with right dosage to control the purple blotch disease effectively. Whereas, 61.90 percent of the farmers did not use the relevant chemicals. The reason for high level of non-adoption may be that usage of overdose and irrelevant chemicals recommended by the input dealers.

The study reveals that the right chemicals with exact dosage were adopted by 36.40 percent of the farmers controlled the leaf miner and majority (63.00%) of the farmers did not adopt. The reason behind high level of non adoption is that damage a symptom of this insect was not identified by the farmer or input dealer.

The study reveals that only 35.60 percent of the farmers used the drip irrigation system in their onion field. The majority (64.40%) of the farmers did not adopt. The reason behind is that farmers were using traditional system of flood irrigation which required no cost and financial constraints also another reason.

The study reveals that 26.10 percent of the farmers followed the procedures of top cutting and 73.60 percent did not adopt. The reason may be that traditionally they followed their own method of top cutting.

The control measures for damping off was adopted by 25.80 percent of total farmers and 74.20 percent farmers did not follow the proper chemicals to control the disease and they used some other chemical which were not recommended.

The study reveals that only 15.60 percent of the farmers adopted the shade curing procedures and the majority (84.40%) of the respondents did not adopt. The reason for low level of adoption is that they did not know the impact of shade curing on quality of onion bulb.

The study of adoption reveals that 15.00 percent of the farmers adopted the recommended chemicals for Stemphylium blight disease with its dosage and whereas 85.00 percent of the farmers did not adopt the relevant chemicals. The reason for high level of non-adoption may be that overdose and irrelevant chemicals recommended by the input dealers.
The study reveals that only 7.20 percent of the farmers were using the ICT services and the majority (92.80%) of the respondents were not either aware or receiving the messages. The reason behind is that most of the farmers could not read the SMSs which is in English and do not spare the times to hear/view the radio and T.V programmes which will be much helpful to the farmers to enhance their yield and revenue.

The study finds that only 5.80 percent farmers applied the top dressing at right dosage at right time. Whereas 94.20 percent respondents did not adopt the dose and timings of application. The reason is that they did not know the importance of timely requirement of nitrogenous fertilizers.

The study found that only 4.40 percent of the farmers followed the instruction of DEMIC and the majority (95.60%) of the farmers either did not follow the instruction or not receiving the forecast information.

The study findings reveal that only 2.80 percent of the farmers adopted the windrow method of field curing and 97.20 percent respondents did not adopt it. The reason for the high level of non adoption may be that they were in hurry to take top cutting once it was lifted from soil.

The study reveals that only 2.20 percent of total respondents adopted the application of *Trichoderma viridi* in this main field and the majorities (97.80%) of the respondents did not adopt. It may be that they did not have much aware about the *Trichoderma viridi* usage in seed propagated aggregatum onion crop.

Only very less farmers (2.20%) adopted the recommended dose of manures and fertilizers at right time. Rest of 97.80 percent respondents did not adopt the recommended dose. The reason is that they were seeking advice from the local input dealers while purchasing the fertilizers and dealers did not know the recommendations and advice the farmers to apply in higher level.

Only 1.90 percent adopted the recommended micronutrient as per the recommendation and 98.10 percent farmers did not adopt. The reason may be that they did not know the impact of micronutrients.
• The study reveals that only 1.70 percent adopted the exact time of application of basal fertilizers while 98.30 percent did not adopt and they applied the fertilizers 15 – 20 days after transplanting.

• Only 1.67 percent of the farmers adopted the recommended bed size and majority (98.33%) farmers did not adopt.

• Only 0.80 percent used the bio fertilizers and 99.20 percent did not use. The reason for the low adoption level is availability of bio fertilizers with local dealers is remote.

• Only 0.60 percent farmers undertook the pre harvest spray in their onion crop and the majority (99.40%) did not take the spray. The reason for low adoption is unawareness of this technology and its impact.

• The study findings reveals that only 0.60 percent of the respondents adopted the improved onion ventilated godown and 99.40 percent did not adopt it. The reason is that Tiruppur district farmers were generally not using storage structures and they kept the onion in the field in temporarily for one or two weeks and sell it.

• The line sowing and root dipping of seedlings before transplanting were not adopted by a single farmer in the study area since they did not have awareness on this concept and also these technologies were not popularized by the extension agencies.

5.5. Correlation and Regression analysis on awareness, knowledge and adoption of respondents

Correlation and regression analysis of awareness level reveals that ten variables namely age, educational status, occupational status, annual income, farm power possession, extension agency contact mass media exposure, scientific orientation, area under onion cultivation and innovativeness were positive and had significant association and contribution to the awareness level of improved protection technologies of seed propagated aggregatum onion growers.
Five variables namely family size, social participation, economic orientation, credit orientation, and risk orientation were negative significant association to the awareness level.

Correlation and regression analysis of knowledge level reveals that seven variables namely educational status, livestock possession, social participation, extension agency contact, credit orientation, economic motivation, and risk orientation had positive and significant association and contribution with knowledge of improved protection technologies of seed propagated aggregatum onion growers.

One variable namely age had negative significant association with the knowledge level.

Correlation and regression analysis of adoption level reveals that six variables namely farming experience, area under onion cultivation, credit orientation, innovativeness, economic motivation and scientific orientation had positive and significant association with adoption level of improved production technologies of seed propagated aggregatum onion.

One variable namely age had negative significant association with adoption level.

5.6. Constraints experienced by the seed propagated aggregatum onion growers

The major constraints faced by the respondents were in need of market facilities through regulated market committee, frequent price fluctuation, unavailability of quality seeds and lack of knowledge on fertilizers and plant protection chemicals, labour shortage, lack of price forecasting service, power supply, lack of awareness and knowledge of package of practices, high cost of inputs, lack of storage facilities, lack of equipment and machineries, difficulty in identifying pest and diseases.
5.7. Conclusion

Conclusion drawn from the present investigations are presented below

Onion production affected by several factors such as poor quality of seeds, lack of awareness on improved production technologies, changes in climate, labour shortage and marketing infrastructures. The majority seed propagated aggregatum onion growers (58.60%) were of old age category, most of them (67.20%) had more than the secondary school level of education. Further the majority (82.50%) of the respondents practicing agriculture as a sole profession and high level of farming experience were possessed by 50.25 percent of the respondents. Most of them (51.67%) had cultivation of onion in more than two acres. The age, educational status, occupational status, annual income, farm power possession, extension agency contact, mass media exposure, scientific orientation, area under onion cultivation and innovativeness are the contributing variables to the awareness level. The contributing variables to the knowledge level are the educational status, livestock possession, social participation, extension agency contact, credit orientation, economic motivation, and risk orientation. Farming experience, area under onion cultivation, credit orientation, innovativeness, economic motivation and scientific orientation are the variables influence the adoption level of the onion growers.

The study findings reveals that awareness level was very low on important technologies such as nursery care management, application of fertilizers, pest and disease control. Similarly the low level of knowledge is observed on the recommended technologies such as dosage of FYM and fertilizers, plant protection and post harvest management which in turn affects the level of adoption.

The low level of adoption was observed in fertilizer application, nursery care management, plant protection and post harvest management. Finally it concluded that the seed propagated aggregatum onion growers in Tiruppur district were lack of awareness, knowledge and adoption in important key technologies which affects the productivity of onion.
5.8. Suggestions

The present research study has offered the following suggestions

1. The top quality seeds should be supplied by the government agencies at nominal cost to the onion growers since quality seeds availability is the major constraint.

2. Since the erratic rainfall and climate change affect the onion production, the subsidy percentage on drip irrigation should be increased to the horticultural crops such as onion.

3. During planting season the water soluble fertilizer, secondary and micro nutrients should be supplied at nominal cost through government depot located at each block level.

4. The storage losses of onion in conventional storage structure are high. Therefore the government can give subsidy linked bank loan facilities to the onion growers to construct the improved onion storage structure recommended by Directorate of Onion and Garlic Research (ICAR).

5. The transportation system should be improved in the major onion blocks so as to have quick transit and avoid transit losses.

6. The government should consider setting up of separate Onion Development Board to promote, regularize and monitor the production and marketing of onion.

7. The subject matter specialist on onion can be appointed at the important onion growing pockets to assist the onion growers and also to facilitate technology dissemination activities.

8. The labour shortage is the major task in the onion cultivation. Therefore the government can consider the channelizing the labour force of Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) to the cultivation of essential commodities such as onion.
9. The specific research programme can be initiated by State Agricultural Universities/ICAR institutes to evaluate the improved varieties on seed propagated aggregatum onion which is tolerable climate change as also resistance to pest and diseases.

10. The State Department of Horticulture can encourage the onion growers to form the farmers’ producers company especially for onion.

11. To make exposure of recent technologies on onion production the exposure visits can be arranged for the onion growers to the leading onion growing belts in the country and also to the research institutes.

12. The State government can arrange the training programme for farmers on production and post harvest management of seed propagated aggregatum onion at State Agricultural University/ICAR to make the awareness of the improved production technologies in the onion.

13. Since in the most of places the input dealers are playing major role in guiding the farmers, the special training should be arranged for the input dealers exclusively for onion crop production technologies.

**5.9. Area of future research**

1. Similar studies may be taken on the other horticultural crops such as vegetable crops in the study area.

2. Similar studies on the seed propagated aggregatum onion may be taken on the other onion growing districts.

3. The study of functional relationship between the onion yield and input used in the production of seed propagated aggregatum onion.

4. The comparative study on precision farming practices versus conventional farming practices of seed propagated aggregatum onion.

5. The study on impact of excessive usage of chemical fertilizers and plant protection chemicals on cost of production and health hazardous.