STUDY ON THE KNOWLEDGE LEVEL OF FARMERS ON TOMATO CULTIVATION UNDER PRECISION FARMING

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ABSTRACT
The study was conducted in Krishnagiri districts where Tamil Nadu Precision Farming Project Tamil Nadu state sponsored turnkey project implemented by Tamil Nadu Agricultural University in 400 ha to train the farmers in precision farming for a period of three years (2004-2007). Krishnagiri district was purposively selected and a Sample of 110 precision farming beneficiaries were considered for the study. The salient findings of the study were, majority of the tomato farmers had medium to high level of knowledge on practicing precision farming technologies in tomato cultivation. Hundred per cent of the respondents had knowledge about use of drip irrigation and fertigation system in tomato cultivation under precision farming, more than ninety per cent of the respondents had knowledge on staking practice, use of portraits for nursery preparation, appropriate spacing and use of optimum seed rate. It was also observed that the knowledge was minimum in adopting yellow sticky trap and growth promoters.

Key words: Knowledge, Precision farming, Tomato.

INTRODUCTION
Agricultural production depends on timely and proper application of technology by farmers. The technology must be scientifically sound, economically feasible, socially applicable and culturally compatible and physically suitable for the farmers as their skills are the main pre-requisite for the successful farming. The existing differences in agro climatic and aforesaid factors do cause variations in the levels of adoption. Green revolution succeeded in India to increase the farmer’s income, yield of major crops and made India self-reliant in food production, with the introduction of high-yielding varieties and use of synthetic fertilizers and pesticides. In the post-green revolution period agricultural production has become stagnant and horizontal expansion of cultivable lands become limited due to burgeoning population and industrialization. The availability of land has decreased application of fertilizers and pesticides become necessary to increase production. The major effect is that our agriculture has become chemicalized. In this situation, it is essential to develop eco-friendly technologies for maintaining crop productivity. Since long, it has been recognized that crops and soils are not uniform within a given field. The farmers have always responded to such variability to take actions, but such actions are inappropriate and less frequent. (FAO,2000). Over the last decade, technical methods have been developed to utilize modern electronics to respond to field variability. Such methods are known as spatially variable crop production, Geographic Positioning System (GPS)-based agriculture, site-specific and Precision Farming. The term ‘spatially variable crop production’ seems to be more accurate and descriptive than the term Precision farming.

Precision farming as an emerging technology with substantial promise to aid both farmers and society. It is an information technology that allows the farmers to apply inputs based on the specific conditions found at each site within a field (Arnholt et al., 2001). In modern agriculture which envisages judicious crop management through application of farm inputs only in required quantities. It is that form of farming where site-specific management practices
are adopted giving due considerations to the spatial variability of land in order to maximize crop production and minimize environmental damage. Precision farming emphasizes on the infield variability which has to be first recognized, located, quantified and recorded, then managed by applying farm inputs in specific amounts at specific time and at specific locations. The advantages of Precision farming is that it offers opportunities to improve agriculture productivity and product quality reduces agro-chemical wastage through efficient application and resulting in minimizing environmental pollution.

**MATERIALS AND METHODS**

Tamil Nadu Precision Farming Project (TNPFP) is a Tamil Nadu State sponsored turnkey project implemented by Tamil Nadu Agricultural University (TNAU) at Dharmapuri and Krishnagiri districts in 400 ha to train the farmers in Precision Farming for a period of three (2004-2007) years with a financial assistance of Rs.720 lakhs. The Tamil Nadu Agricultural University was undertaking this project and implemented with the co-operation of the state departments of Horticulture, Agricultural Engineering, Agriculture, Agricultural Marketing and Agri-Business and the District Administration. High value crops like tomato, brinjal, sugarcane, banana, gherkins, hybrid capsicum, paprika, baby corn, and white onion, bhendi, cabbage and cauliflower have been proposed to be cultivated under the scheme. Under this project, 100 per cent subsidy was given on the cost of cultivation of the first crop to the farmers selected during first year. Ten per cent of the cost of cultivation was collected from the farmers selected during second year and 20 per cent of the cost of cultivation was collected from the farmers selected during third year. The project area lies in the districts of Dharmapuri and Krishnagiri of Tamil Nadu state. The area covered in these districts are 100 ha, 200 ha and 100 ha during the years 2004-05, 2005-06 and 2006-07 respectively. 400 ha were planted with 23 kinds of crops over three years and recorded 60 per cent increases in yield and 90 per cent marketable quality. The Precision Farming programme is now being scaled up into all the districts of Tamil Nadu under NADP (National Agricultural Development Programme) for the benefit of farming community and the following is the target distribution among implementing agencies for implementation to cover 12,800 ha during 2007-08 (www.tnau.ac.in). To know the extent of adoption of technology it is assumed that assessment of knowledge is one of the important components. English and English (1961) defined knowledge as a body of information possessed by an individual which is in accordance with the established fact. In this research study, knowledge denotes the farmers understanding about the different technologies of Precision Farming in tomato cultivation. Keeping this in view, the present study was designed and conducted.

Krishnagiri district was taken for this study in which Denkanikottai, Krishnagiri and Hosur taluks were purposively selected on the basis of maximum area under precision farming. A sample size of 110 precision farming farmers were selected for the study. The sample was proportionately allotted in each of all the selected taluks. The data collection was done with the use of a well structured and pre tested interview schedule including all aspects of knowledge on tomato cultivation under precision farming. The knowledge level of the respondents with tomato cultivation under precision farming was measured by designing exclusively the knowledge test as given below.

**Item analysis:** A list of items seeking knowledge on technologies of precision farming in tomato cultivation was prepared from the already identified technologies with the help of experts from Tamil Nadu Agricultural University. The selected items were administered to 15 respondents in the non-sampling area. Scores of 2 and 1 were given to “correct” and “incorrect” answers respectively. The total score for each respondent was calculated. Afterwards the total scores of the respondents were arranged in descending order. As suggested by Singh AK (1986), 27 per cent of the upper groups constituted as “high group” and 27 per cent of bottom group as “low group”. The score of these two groups were considered for calculating item difficulty and item discrimination indices.

**Difficulty index:** The difficulty index was computed by averaging the proportion of correct answers in high group and the proportion of correct answers in low group. The formula for determining the index on the basis of the extreme group is as under.
Where,
P is the index of difficulty
\( R_U \) is the number of examinees answering correctly in the upper group
\( R_L \) is the number of examinees answering correctly in the lower group
\( N_U \) is the number of examinees in the upper group
\( N_L \) is the number of examinees in the lower group

**Discrimination index:** Discrimination index is referred to the extent to which an item discriminates well informed individual from the poorly informed ones. It was evaluated using the ‘Net D index of discriminations’, which had been defined as an unbiased index of absolute difference in the number of discriminations made between the upper group and the lower group, it is proportional to the net discriminations made by the item between the two groups, i.e., the difference between the proportion of correct answers of the high / upper group 27 per cent and low group 27 per cent examinees.

\[
V = \frac{R_U - R_L}{N_U - N_L}
\]

Where,
\( R_U \) is the number of examinees answering correctly in the upper group.
\( R_L \) is the number of examinees answering correctly in the lower group.
\( N_U \) is the number of examinees in the upper group.
\( N_L \) is the number of examinees in the lower group.
\( V \) is the discriminating power or validity

The difficulty index and discriminatory index were the criteria for selecting an item for a test. For the present study, difficulty index of 0.4 to 0.6 and discrimination index of above 0.4 were selected after thorough evaluation. The selected items were then administrated to the respondents in the study area. A score of two was given for the correct answers and a score of one was given for the incorrect answers. Accordingly the knowledge level of the respondents was calculated using the formula followed by Madhan (2002).

The formula followed by Madhan for calculating the knowledge index of each respondent was

\[
Knowledge \ index = \frac{K}{P} \times 100
\]

Where,
\( K \) = Knowledge scores obtained by an individual respondent
\( P \) = Maximum possible scores for all items

The respondents were classified into three categories such as low, medium and high using mean and standard deviation.

**RESULTS AND DISCUSSION**

Knowledge has been referred as the body of information possessed by an individual who is in accordance with the established fact. The body of information possessed by the individuals influences them to behave in a particular manner. Knowledge is a pre-requisite for adoption of innovation, as this would enable the farmers to completely understand a technology and its relative advantage. Hence, an attempt was made to assess the knowledge.

The responses of the farmers were analyzed and the respondents were categorized into low, medium and high based on their overall knowledge on the selected items. The distribution of respondents according to their knowledge level is presented in the Table 1.

It could be inferred that majority of the respondents (43.64%) had medium to high level of knowledge on tomato cultivation under Precision Farming. About 17.27 per cent of the respondents had low level of knowledge on tomato cultivation under Precision farming.

The appropriate reason for medium to higher level of knowledge on the recommended tomato cultivation practices might be due to the fact that, majority of the respondents were literate, with higher level of scientific orientation and medium to high level of extension agency contact. In order to increase their income this would have aroused their interests to acquire more knowledge. Further, the agricultural scientists also played an important role in both

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>19</td>
<td>17.27</td>
</tr>
<tr>
<td>Medium</td>
<td>48</td>
<td>43.64</td>
</tr>
<tr>
<td>High</td>
<td>43</td>
<td>39.09</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
<td>100.00</td>
</tr>
</tbody>
</table>
extension and educational activities. Due to this reason the knowledge on tomato cultivation under Precision Farming was medium to high among the respondents.

**Technology-wise knowledge level of tomato growers under Precision Farming:** Efforts were made to find out the technology-wise knowledge level of the respondents. The results were analyzed and discussed below.

It could be observed from the Table 2 that cent per cent of the respondents had knowledge on use of drip irrigation and fertigation system in tomato cultivation under Precision Farming. More than ninety per cent of the respondents had knowledge on staking practice (98.18 %), use of portrays for nursery preparation (92.73 %), appropriate spacing (92.73 %) and use of optimum seed rate (90.00 %).

Knowledge level was found to be minimum in the practices such as use of yellow sticky trap and use of growth promoter. Hundred per cent of the respondents had higher level of knowledge about use of drip irrigation and fertigation system in tomato cultivation under Precision Farming. This might be due to the fact that the principle element of Precision Farming is drip and fertigation system and the respondents had frequent contact with the drip manufacturers and agricultural scientists.

Most of the respondents had much knowledge about appropriate spacing, optimum seed rate and use of portrays for nursery preparation. The possible reason might be due to effort of agricultural scientist in conducting field trails, campaign, training and clarifying the respondent’s doubts regarding precision farming technologies in tomato cultivation.

The knowledge level was less regarding the use of yellow sticky trap and use of carbendazim, since the farmers had less awareness about physical and biological pest control. The farmers had less knowledge in use of growth promoter due to the lesser awareness on it.

**CONCLUSION**

It could be concluded that majority of the respondents (43.64%) had medium to high level of knowledge on tomato cultivation under Precision Farming. About 17.27 per cent of the respondents had low level of knowledge on tomato cultivation under Precision Farming. Hundred per cent of the respondents had knowledge about use drip irrigation and fertigation system in tomato cultivation under Precision Farming, more than ninety per cent of the respondents had knowledge on staking practice (98.18%), use of portrays for nursery preparation (92.73%), appropriate spacing (92.73%) and use of optimum seed rate. Knowledge was minimum in the practices like practicing yellow sticky traps use of growth promoters.

### TABLE 2: Technology wise knowledge levels of tomato growers under Precision Farming

<table>
<thead>
<tr>
<th>Technologies</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chizel ploughing</td>
<td>95</td>
<td>86.36</td>
</tr>
<tr>
<td>Optimum seed rate</td>
<td>99</td>
<td>90.00</td>
</tr>
<tr>
<td>Seed treatment with Trichoderma viridi</td>
<td>52</td>
<td>47.27</td>
</tr>
<tr>
<td>Use of portrays for nursery preparation</td>
<td>102</td>
<td>92.73</td>
</tr>
<tr>
<td>Appropriate spacing</td>
<td>102</td>
<td>92.73</td>
</tr>
<tr>
<td>Fertilizer recommendation (200:62.5:250)</td>
<td>93</td>
<td>84.55</td>
</tr>
<tr>
<td>Application of water soluble fertilizer</td>
<td>85</td>
<td>77.27</td>
</tr>
<tr>
<td>Drip irrigation and Fertigation method</td>
<td>110</td>
<td>100</td>
</tr>
<tr>
<td>Use of growth promoter</td>
<td>26</td>
<td>23.64</td>
</tr>
<tr>
<td>Use of yellow sticky trap to control wilt disease</td>
<td>4</td>
<td>3.64</td>
</tr>
<tr>
<td>Use of carbendazim to control wilt disease</td>
<td>35</td>
<td>31.82</td>
</tr>
<tr>
<td>Staking practice</td>
<td>108</td>
<td>98.18</td>
</tr>
</tbody>
</table>
REFERENCES


www.tnau.ac.in