Impact of Plant Protection Activities on Production and Productivity of Crops in Jammu Region (J&K), India

Shahid Ahamad1*, Banarsi Lal2, Abhay Sinha3, Amitesh Sharma4 and Jag Paul Sharma5

Abstract

The impact of plant protection activities conducted during 2010-11 to 2015-16 was studied based on individual interactions as well as Focused Group Discussion (FGD) of 100 farmers in Reasi district of J&K, India. Their response to a pre-defined questionnaire indicated that the activities enhanced the intensity of crop substitution, escalated Seed Replacement Rate (SRR) with intensification of input use. Improved crop production and productivity with reduced production cost and also enhanced profit margin with other short term effect of the programmes. Under performance of technologies tested in OFTs for management of Chilli wilt diseases was recorded 22.5% less disease incidence with 24.5% yield advantage over control, 20% yield enhanced over control in management of red pumpkin beetle in bottle gourd, 25% less rotting with 35%yield advantage over control in IDM module for rhizome rot management in ginger, 10.5% additional yield over control in loose smut disease management in wheat and 45.5% additional yield over control in yellow rust disease management in wheat. Performance of Front Line Demonstrations on plant protection activities conducted by KVK, Reasi during 2010-11 to 2015-16 showed 15.5% more yield than the local practice no spraying of pesticides with reduced wilt incidence under IDM for wilt management in tomato. The demonstration has exhibited 25.5% more yield than the local practice (not use of pesticides) of IDM in Chilli wilt, the demonstrated fungicides exhibited 20.5% higher yield than un sprayed crop under yellow rust disease management in wheat. The varieties i.e. PBW-175 exhibited 25.5% higher yield than the local check under yellow rust disease of wheat tolerant varieties. The demonstration has exhibited 34.5% more yield than the local practice under IDM modules for rhizome rot management in ginger. Under plant protection activities on productivity of crops over time under rainfed condition exhibited in maize in 2010-11 there was only 14 q/ha yields of maize var. Double Deklab which increased up to 26 q/ha in 2015-16 after KVK interventions. So, there was increased 85.71 % in the yield. Similarly, there was enhanced 71.42% yield of maize var. Bio seed in the same duration. There was enhanced in 64.28% and 85.71 % of wheat yield of varieties PBW-175 and Raj-3765 respectively during the same period. The increase in yield of mash variety Uttara was 37.50%, lentil var. L-4147 65.71%, mustard var. RSFR-01 51.11% and Oat var. Kent 86.25% respectively in the same year. Development of professionalism and entrepreneurship resulting in enriched socio economic status of farmers were also indicated. The productivity of crops was found to be influenced considerably over time because of these activities along with the improved varieties and/or improved crop management practices followed by the farmers of Reasi.

Keywords:
Impact; Plant protection activities; OFT, FLD; Crop production; Productivity; KVK; Reasi

Introduction

India as a country is one of the biggest food consumers in the world and there is dire need to keep our agricultural sector vibrant and alive for our food security. More than half of our country population owes its social, economic and even cultural life to the state of this sector. Governments after governments gave the importance to agriculture but when it came to policy making then it is left to struggle. Agriculture is the sole source of livelihood for more than two-third of the population and there is dearth of basic infrastructure in agriculture for instance irrigation, post-harvest facilities, research Centre’s, loan facilities etc. which have impact on farmer income levels. India achieved the feat of “deficit to surplus” status with the introduction of Mexican dwarf wheat that brought the great Green revolution in India during the sixties. One third of the Indian population depends on wheat as their main food. India is the second largest producer of wheat after China claiming the position of a significant stakeholder in Global wheat production. During the XI plan period (2007-08 to 2011-12), the country experienced steep increase in total food grains production. Being one of the major contributors of country’s total food grains production, wheat production was recorded to be 93.5 million tons reaped from an area of 29.65 million ha with productivity level of 3119 kg/ha. The level of production was further augmented to an all-time record figure of 95.85 million tons during the year 2013-14. Agriculture is the backbone of Jammu and Kashmir State and this sector provides employment directly or indirectly to around 70 per cent of the state population. Agriculture contributes about 65 per cent of the state revenue which signifies the overdependence of the state on agriculture. The total geographical area of this state is 2.22.236 sq. km and its population is 1, 25, 48,926 (Census 2011). Jammu and Kashmir is a mountainous state in which Jammu region is predominantly sub-tropical while Kashmir and Ladakh regions are temperate. The average size of land holding of the state is only 0.67 hectare. Reasi, a small district of Jammu province, It is predominantly a hilly district, which enjoys variable climatic conditions, ranging from sub-tropical to the semi temperate. Geographical status of the district we can divide the district into ‘Hilly’ and ‘Low Lying Hilly' region. The District is divided into 'Hilly' and 'Low Lying Hilly' region. The District is divided into 1

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into nine Tehsils & it has 22 Niaebats. There are 12 development blocks with 147 Panchayat Halquas. The primary occupation of the people is agriculture & allied activities, and it is economically as under developed district. Maize, wheat is the main crops grown in the district, but now farmers have started to diversify in horticulture and vegetable crops as well. Around 80% of the total populations are farmers and/ or farm labourers. The climate of the district is characterized by a subtropical to temperate. The district receives around 1363 mm rainfall distributed erratically. Maize is the main crop of the district which occupies around 50% of the gross cropped area. Wheat, green gram, black gram, lentil, chickpea, toria, mustard and paddy are other important field crops. Brinjal, tomato, potato and cole vegetable crops are cultivated in a sizeable area. The important fruit crops are mango, guava, citrus, apple, walnut, pear, peach, apricot and plum. Ahamad [1] used cultural practices for disease management of crops. Ahamad and Narain [2] use ecofriendly practices for control of major crops. Das and Baruah [3] used local practices to control pests and diseases of fruit crops. Ahamad [4], Ahamad et al. [5], Ahamad [6] Ahamad [7] use various diseases management practices in cereals, pulses, oilseed, horticultural and vegetables crops. The major contingencies faced by the agricultural production system of the district are irregular drought, heat and cold waves, hailstorms and sporadic outbreak of pests and diseases. The use of high yielding hybrid varieties, excessive use of chemical fertilizers, injudicious application of poisonous pesticides and above all the changing climatic conditions have increased pest and disease problems of crops tremendously [4]. Different activities on plant protection accomplished by KVK, Reasi during 2010-11 to 2015-16 and their impact on production and productivity of crops were studied

Material and Methods

On Farm Testing (OFT) is the most important activity of Krishi Vigyan Kendra of India to identify the location specificity of technologies under various farming systems. Five numbers of technologies viz. Management of red pumpkin beetle in bottle gourd, assessment of IDM module for rhizome rot management in ginger, loose smut disease management in wheat, yellow rust disease management in wheat and Chili wilt disease management have been tested in the farmers' field involving 20 practicing farmers under Farmers Participatory on Farm Testing programme for management of insect pests and diseases of different crops during the period under report (Figure 2). Five numbers of plant protection technologies name demonstration of IDM for wilt management in tomato, demonstration of IDM in Chili wilt, demonstration of yellow rust disease management in wheat, demonstration of yellow rust disease of wheat tolerant varieties and demonstration of IDM modules for rhizome rot disease management in ginger had been demonstrated in the farmers' field under Front Line Demonstrations (FLD) programme to establish their production potentials as well as to spread them widely by motivating the farmers and other stake holders on the principle of “Learning by doing” and “Seeing is believing”.

The important technologies demonstrated and their results are given in Table 1. The relevant training programmes and field days had been organized at different critical growth periods involving all the stakeholders to discuss the process of demonstration and their outcome in details. Care had been taken for documentation and dissemination of success of technologies through print and electronic media for wider publicity. The success stories had been published and circulated to a large number of farmers for greater acceptability too. The successful farmers had been awarded in special occasions for their achievement and active participation in the programme. Training farmers and farm women to update their knowledge and skills in modern agricultural were imparted to the which is an important mandatory activity of Krishi Vigyan Kendra.

Results and Discussion

Out of five (OFTs), four technologies (Table 1) tested successfully and well appreciated by the farmers for their field performance were selected for the study. The important technologies demonstrated and their results are given in Table 2. Around 36 Capacity Building Training Programmes (Table 3) on various aspects of plant protection covering 704 participants had been conducted for farmers and unemployed rural youth of the district as per their requirement during the period under report. Priority had also been given for training of extension personnel of departments with due involvement in different Govt. sponsored programmes/schemes to orient them towards the frontier areas of technology development. Besides the above OFT, FLD and Training programmes, a good number of other extension activities viz. Field Days, Film Shows, Campaigns, Group meetings, Lecturers, Awareness camps, Diagnostic field visits had also been performed and extension bulletins and leaflets/booklets were also published and distributed to the farmers, Agriculture department Officers.

Management of Chili wilt 22.5% less wilting with 24.5% yields advantage over control. Moreover, the farmers were provided the weather based advisory forecasting through Kissan Mobile Advisory Service (KMA) at regular intervals to protect their crops from possible contingencies. They have been extended all sorts of help, cooperation, motivation and encouragement as and when they need for effective crop protection (Figure 2).

In 2010-11 there was only 14 q/ha yield of maize var. Double Deklab which enhanced up to 26 q/ha in 2015-16 after KVK interventions. So, there was increase in 85.71% enhanced in the yield. Similarly, there was increased 71.42% in the yield of maize var. Bio seed in the same duration. There was enhanced in 64.28% and 85.71 % of wheat yield of varieties PBW-175 and Raj-3765 respectively during the same period. The increase in yield in mash variety Uttara was 37.50%, lentil var. L-4147 was 65.71%, mustard var. RSPR-01 51.11% and Oat var. Kent was 86.25% in the same duration. So, there was high impact of FLDs laid in the district from 2010-11 to 2015-16 (Figure 3).
Table 1: Performance of Technologies tested under OFTs for management of pests & diseases.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Technology tested</th>
<th>Farmer’s practice</th>
<th>Details of technology tested</th>
<th>Performance of the technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Management of Red pumpkin beetle in bottle gourd</td>
<td>Indiscriminate spraying of insecticides</td>
<td>Dusting of Seven dust at 15 days interval.</td>
<td>20% yield enhanced over control.</td>
</tr>
<tr>
<td>2</td>
<td>Assessment of IDM module for rhizome rot management in ginger</td>
<td>No specific measures</td>
<td>Selection of disease free seed, Seed treatment with Carbendazim 0.2% solution and soil drenching with rido mil.</td>
<td>25% less rotting with 35% yield advantage over control.</td>
</tr>
<tr>
<td>3</td>
<td>Loose smut disease management in wheat</td>
<td>No seed treatment</td>
<td>Seed treatment with Corboxin i.e. Vitavax@0.2%</td>
<td>10.5% additional yield over control.</td>
</tr>
<tr>
<td>4</td>
<td>Yellow rust disease in wheat management.</td>
<td>No spraying of fungicides</td>
<td>Spraying with Propiconazole (Till) @ 0.1%. 1ml / litre water</td>
<td>45.5% additional yield over control.</td>
</tr>
<tr>
<td>5</td>
<td>Chili wilt disease management</td>
<td>No spraying of fungicides</td>
<td>Seed treatment with Carbendazim 0.2% solution, transplanting in raised bed and soil drenching with Copperoxylchloride solution.</td>
<td>22.5% less wilting with 24.5% yield advantage over local check.</td>
</tr>
</tbody>
</table>

Impact assessment of plant protection activities on production system

The study was conducted during 2014-15 in 10 adopted villages of KVK. It was based on individual interactions as well as Focused Group Discussion (FGD) of 100 farmers exposed to those technologies earlier along with their response to a pre-defined questionnaire. The general impact of these technologies on production system deduced from the response to probed questions to the participating farmers and extension functionaries was summarized below.

Enhancement of crop substitution

Increased area under non-paddy crops was observed probably due to more profit from vegetables, pulses and other cash crops because of better crop protection measures adopted by farmers [8].

Escalation of Seed Replacement Rate (SRR)

Better return from high yielding varieties due to improved crop protection measures probably enhanced the seed replacement rate of different crops. Similar results have earlier been reported by Mohapatra and Das [9] in Bargarh district of the Odissa state.

Input intensification

Adoption of improved technology along with new generation molecules, bio-agents, bio-pesticides and other newer things like yellow sticky trap, pheromone trap and light trap etc. in crop protection programmes resulted in intensification of inputs. This result corroborates of earlier findings of Das [10,11].

Improvement of production and productivity of crops

By the KVK interventions there was improvement in the production and productivity of the crops in the district. The increase in the yield of the crops increased socio-economic status of the farmers.

Reduction of production cost and enhancement of profit margin

By the KVK interventions there was reduction of production cost of farmers and also enhanced productivity of the crops in the district. Similar effect has earlier been reported by Tomar [12].

Development of professional approach

By Adoption of new agri-techniques in agriculture by farmers can be effective in development of agricultural economy and farmers’ prosperity. The farmers, especially the rural youths, must imbibe the basics of agri-entrepreneurship and factors affecting its development.
intense desire and will power to achieve the goal of earning most of the benefits by undertaking innovative activities of agricultural and allied sectors enterprises such as dairy, poultry, fishery, bee-keeping, horticulture, floriculture etc. together in symbiosis including the work of agri-value addition in order to improve one’s livelihood by dint of actively engaging oneself in profitable and innovative agricultural enterprises by consistent hard work and adequate risk bearing ability.

Enrichment of socio economic status

Specific effect with respect of productivity of crops as perceived from the above study was given in Table 4. The productivity of crops was found to be increased considerably over time. Besides the above plant protection activities, the role of improved varieties and/or improved crop management practices followed by the farmers over the time, provision of latest technologies through various means, credit and other facilities cannot be over ruled for this transformation.

Conclusions

Based on five years plant protection activities carried out at Reasi district red pumpkin beetle in bottle gourd may be managed through dusting of Phorate 10 G dust at 15 days interval, rhizome rot ginger may be managed through selection of disease free seed, rhizome dipping with Carbendazim 0.2% solution, and soil drenching with metalaxyl. Loose smut disease in wheat easily controlled by seed treatment with Corboxin i.e. Vitavax @0.2%. Yellow rust disease of wheat managed through spraying of Propiconazole Tilt@0.1% (1ml/ litre) water and Chili wilt disease may be managed through Seed treatment with Carbendazim 0.2% solution, transplanting in raised bed and soil drenching with Copperoxychloride solution. Maize var. Double Deklab is recommended to the farmers of Reasi district as it has enhanced 85.71% yield over check. In Wheat var.Raj3765 is recommended as it enhanced 85.71% more yield over check. In pulses (Black gram) var. Uttara and in Lentil var. L 4147 are recommended for the region. In oilseed mustard var. RSPR 01 and fodder (Oat) var. Kent are recommended for Reasi district.

Table 4: Effect of Plant protection activities on productivity of crops under rainfed condition.

<table>
<thead>
<tr>
<th>Crops</th>
<th>Productivity (q/ha) before interventions (2010-11)</th>
<th>Productivity (q/ha) After interventions (2015-16)</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal Maize</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>var. Double Deklab</td>
<td>14.0</td>
<td>26</td>
<td>85.71</td>
</tr>
<tr>
<td>var. Bioseed</td>
<td>14.0</td>
<td>24</td>
<td>71.42</td>
</tr>
<tr>
<td>Wheat var. PBW-175</td>
<td>14.0</td>
<td>25</td>
<td>64.28</td>
</tr>
<tr>
<td>var. Raj3765</td>
<td>14.0</td>
<td>26</td>
<td>85.71</td>
</tr>
<tr>
<td>Pulses (Black gram)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Var. Uttara</td>
<td>4.0</td>
<td>6.5</td>
<td>37.50</td>
</tr>
<tr>
<td>Lentil var. L 4147</td>
<td>3.5</td>
<td>5.8</td>
<td>65.71</td>
</tr>
<tr>
<td>Oilseed Mustard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>var. RSPR 01</td>
<td>4.5</td>
<td>6.8</td>
<td>51.11</td>
</tr>
<tr>
<td>Fodder(Oat) var. Kent</td>
<td>200.0</td>
<td>372.5</td>
<td>86.25</td>
</tr>
</tbody>
</table>

References