

minimized the use of pesticides. The seed replacement in varieties of important vegetables varied from 42 per cent in leafy vegetables to 99 per cent in tomato, the overall replacement of the seed being nearly 80 per cent. Such a high rate of seed replacement indicates the importance given by the farmers to utilize good quality seeds for increasing production and getting higher net returns from vegetable cultivation.

Under the AICRP (VC) programme, a total of 157 seed production technologies have been developed in major crops (Fig. 12) with major emphasis on seed germination, seed pathology, seed longevity, seed storage and seed production techniques.

(E) Holistic approach on IPM

Insect pests are major biotic constraints in vegetable production in India. Among these tomato fruit borer (*Helicoverpa armigera*), brinjal shoot and fruit borer (*Leucinodes orbonalis*), chilli thrips (*Scirtothrips dorsalis*) and mite (*Polyphagotarsonemus latus*), fruit and shoot borer (*Earias spp.*) on okra, diamondback moth (*Plutella xylostella*) on cole crops, fruit fly (*Bactrocera cucurbitae*) on cucurbits are important ones. Average yield loss due to major insect pests in different parts of the country is reported to vary from 33 to 40 per cent (Table 21).

Table 21: Yield losses due to major insect pests in vegetables in India

| Crop/Pest | Approx. Yield loss (%) | Crop/Pest | Approx. Yield loss (%) |
|---|------------------------|---|------------------------|
| Tomato | | Cabbage | |
| Fruit borer (<i>H. armigera</i>) | 24-65 | Diamondback moth (<i>Plutella xylostella</i>) | 17-99 |
| Brinjal | | Cabbage caterpillar (<i>Peiris brassicae</i>) | 69 |
| Fruit and shoot borer (<i>Leucinodes orbonalis</i>) | 11-93 | Cabbage leaf webber (<i>Crocidolomia binotalis</i>) | 28-51 |
| Chillies | | Cabbage borer (<i>Hellula undalis</i>) | 30-58 |
| Thrips (<i>Scirtothrips dorsalis</i>) | 12-90 | Cucurbits | |
| Mites (<i>Polyphagotarsonemus latus</i>) | 34 | Fruitfly (<i>Bactrocera cucurbitae</i>) | |
| Okra | | Bitter gourd | 60-80 |
| Fruit borer (<i>H. armigera</i>) | 22 | Cucumber | 20-39 |
| Leafhopper (<i>Amrasca biguttula biguttula</i>) | 54-66 | Ivy gourd | 63 |
| Whitefly (<i>Bemisia tabaci</i>) | 54 | Musk melon | 76-100 |
| Shoot and fruit borer (<i>Earias vittella</i>) | 23-54 | Snake gourd | 63 |
| | | Sponge gourd | 50 |

However, in recent context of changing agroecosystems and climate, several other pests such as mealy bugs, leaf miners, mites, white fly, *Maruca*, fruit fly, giant African snail have also intensified their occurrences which are adding to heavy loss of crops. Chemical method still enjoys first choice because of its easy availability and quick action, and consumes about 13-14 per cent of the total pesticide use in India. However, some of the tolerant varieties/lines have been identified against major pest. Through the AICRP (VC) a total of 105 technologies have been developed (Fig. 13).

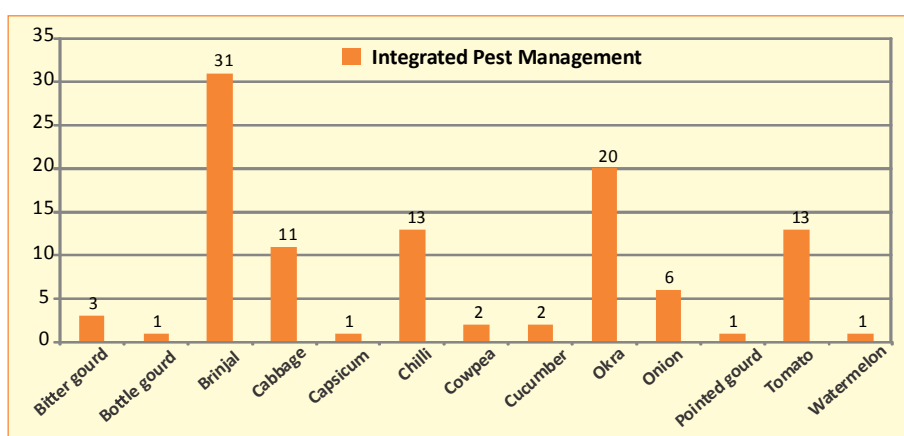


Fig. 13: Cropwise Integrated Pest Management Technologies Developed from 1971-2014

Source: Kalode and Sharma, 1993