

Table 22: Tolerant varieties of some vegetable crops against major insect pests

Crop	Pest	Varieties
Tomato	Fruit borer (<i>H. armigera</i>)	Arka Vikash, Pusa Gaurav, Pusa Early Dwarf, Punjab Keshri, Punjab Chhuhara, Pant Bahar.
Brinjal	Shoot and fruit borer (<i>L. orbonalis</i>), Aphid, jassid, thrips, whitefly	SM 17-4, PBr 129-5 Punjab Barsati, ARV 2-C, Pusa Purple Round, Punjab Neelam, Kalyanpur-2, Punjab Chamkila, Gote-2, PBR-91, GB-1, GB-6
Cabbage	Aphid (<i>Brevicoryne brassicae</i>)	All season, Red Drum Head, Sure Head, Express Mail
Cauliflower	Stem borer (<i>Hellula undalis</i>)	Early Patna, EMS-3, KW-5, KW-8, Kathmandu Local
Okra	Jassid (<i>Amrasca biguttula</i>)	IC-7194, IC-13999, New Selection, Punjab Padmini
Onion	Thrips (<i>Thrips tabaci</i>)	PBR-2, PBR-6, Arka Niketan, Pusa Ratnar, PBR-4, PBR-5.
Round gourd, Pumpkin, Bitter gourd	Fruit fly (<i>B. cucurbitae</i>)	Arka Tinda Arka Suryamukhi Hissar-II

(F) Integrated Diseases Management

The vegetable production is significantly influenced by the biotic and abiotic stresses. Among biotic stresses, wilt and leaf spot are considered to be the major diseases of vegetables. In vegetables, *Phytophthora*, *Fusarium*, *Verticillium* and *Ralstonia* are the major pathogens of wilt diseases while *Alternaria*, *Cercospora* and *Colletotrichum* are belonging to leaf spot diseases. Apart from this, major threat to vegetable production is due to viral diseases caused by leaf curl and spotted wilt viruses. The yield loss due to the diseases was estimated at 50-80 % from the heavily infected field (Table- 23). Management of these diseases with chemicals leads to many ill effects on environment and human and animal health. Alternatively, use of bio-control agents for the management of diseases have been documented. However field delivery system and efficacy of biocontrol agents are still question of success. In many instances the aforesaid methods fail to combat the diseases due to evolution of new biotype/stain/pathotype/race in the pathogen system.

Table 23: Extent of losses of due to major diseases of different vegetables

Crop	Diseases	Approx. Yield loss (%)
Tomato	Early blight <i>Alternaria solani</i>	78
	Wilt, <i>Fusarium oxysporum</i> f. sp. <i>lycopersici</i>	10-60
	<i>V. dehalie</i>	20-30
Egg plant	Begomoviruses	Severe cases 100
	Blight- <i>Phomopsis vexans</i> ,	30-50
Chilli	Anthracnose <i>Colletotrichum</i> spp.	30-80
	Late blight <i>Phytophthora capsici</i>	10-25
	Viral disease due CMV and PVY	66.7-74
Okra	Screening against YVMV	50-90
	Leaf curl virus	30-70
Cabbage and Cauliflower	Screening against <i>Cercospora</i> blight	43.6
	Black rot <i>Xanthomonas campestris</i> pv. <i>campestris</i> ,	50
Cucurbits	Blight- <i>Phytophthora capsici</i>	100
Radish	<i>F. o. f. sp. raphani</i>	20-40

To protect vegetable crops against diseases, several recommendations have been made. In tomato, an effective control for buck eye rot, late blight, early blight, spotted wilt virus and damping off has been recommended. To control diseases of brinjal, viz. blight, phomopsis blight, cercospora leaf spot and little