Role of Resistant Varieties in Organic Farming to Control Biotic Stress of Vegetable Crops

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A balanced diet contains adequate energy sources, nutrients, vitamins, minerals, carbohydrates, fats, protein, etc. Vegetables are a reliable source for many dietary factors. As vegetables contain many of the dietary factors like vitamins, minerals and amino acids they are considered as protective supplementary food. Vegetables give taste and supply a fair amount of fibre. A diet rich in vegetables can lower blood pressure, reduce the risk of heart disease and stroke, prevent some types of cancer, lower the risk of eye and digestive problems and have a positive effect on blood sugar, which can help to keep appetite in check. Eating non-starchy vegetables and green leafy vegetables may even promote weight loss (Bertoia et al., 2015). Vegetables are a rich source of phytochemicals like lycopene, quercetin, allicin, saponin, etc. These phytochemicals act as antioxidants, anticarcinogenic anti-inflammatory agents, etc. Their low glycemic loads prevent sugar and that can increase hunger. Vegetables can also neutralise the acids produced during the digestion of proteins and fats.

The contribution of vegetables remains the highest (59-61%) in horticulture crop production over the last five years. The production of vegetables has increased from 101.2 million tonnes to 184.40 million tonnes from 2004-05 to 2017-18 with average productivity of 17.97 tonnes/ha (NHB, 2018). However, this amount is much less than our requirement and serves per capita intake of vegetables only 210 g against the requirement of 300g (Muthukumar, 2013). For the supply of 1.30 billion people in India we need to achieve 300 million tonnes with availability of 250g/day. To achieve this, we have to improve the productivity of vegetable crops.

The productivity of vegetable crops is limited by the complexity of biotic stress interactions such as pests and diseases. The growing demand for vegetables has led to large-scale intensive cultivation. This, in turn, resulted in an enhanced incidence of pests and diseases inflicting heavy crop loss. The pests and diseases can also be controlled by using different plant protection chemicals, but these practices are becoming unsustainable as substantiated by diminishing crop productivity, causing environmental pollution, increasing pesticide residues in crop produce and finally affecting the health of human beings, animals, soil, etc. This requires an alternative approach and environmentally safe agriculture method to increase the productivity of crops.

Organic farming can play a major role towards sustainable agriculture under the current situation of climate change. Organic agriculture is a holistic production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity, and cycles adapted to local conditions rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved (IFOAM, 2023). This is a method of farming that works at the grassroots level preserving the reproductive and regenerative capacity of the soil, good plant nutrition, and sound soil management, produces nutritious food rich in vitality and has resistance to diseases. Organic products are grown under a system of agriculture without the use of chemical fertilizers and pesticides with an environmentally and socially responsible approach. India produces a wide range of food crops including vegetables. The public is giving more emphasis on organic products than inorganic food products.

Few options for plant protection substances are available for certified organic growers compared to conventional ones. Thus, they should capitalize on the natural processes and management of the ecosystem to control harmful organisms (Hamadttu, 2018). Therefore, the most economical and environment-friendly method of controlling these biotic stress conditions appears to be the use of resistant varieties.

Growing resistant varieties is an important cultural pest and disease management practice to include in a crop management program since these varieties do not get infected with diseases. Therefore, pesticides are not required to protect them from pests and diseases. The resistant varieties can be developed through different breeding strategies like direct selection, hybridization followed by selection, back cross method, mutation breeding, marker-assisted selection, tissue culture techniques, etc.

Breeding for pests and disease resistance is an excellent approach to overcoming economic losses caused by biotic factors in plants. Development and deployment of biotic stress-resistant varieties will

Crop	Variety name	Specifications
Tomato	Arka Abha	Resistant to bacterial wilt
	Arka Alok	Resistant to bacterial wilt
	Arka Samrat	Resistant to tomato leaf curl virus, bacterial wilt and early blight
	Arka Rakshak	Resistant to tomato leaf curl virus, bacterial wilt and early blight
	Arka Abhed	Resistant to tomato leaf curl virus, bacterial wilt, early blight and late blight
	Arka Aditya	Resistant to tomato leaf curl disease, bacterial wilt and early blight
	Kashi Adarsh	Resistant to tomato leaf curl virus disease
	Kashi Aman	Resistant to tomato leaf curl virus disease
	Kashi Vishesh	Resistant to tomato leaf curl virus disease
	Phule Jayasree	Moderately resistant to leaf curl and spotted wilt virus
Brinjal	Arka Anand	Resistant to bacterial wilt
	Arka Nidhi	Resistant to bacterial wilt
	Arka Kesav	Resistant to bacterial wilt
	Arka Haritha	Resistant to bacterial wilt
	Arka Avinash	Resistant to bacterial wilt
	Arka Neelkanth	Resistant to bacterial wilt
	Bidhan Supreme	Resistant to bacterial wilt
	Kashi Himani	Tolerant to fruit and shoot borer
	PB 67	Resistant to bacterial wilt and Phomopsis blight
	Ponny	Resistant to bacterial wilt
Chilli	Arka Harita	Tolerant to powdery mildew, chilli venal mottle virus
	Arka Meghana	Tolerant to chilli venal mottle virus
	Arka Sweta	Tolerant to cucumber mosaic virus
	Arka Kyathi	Tolerant to cucumber mosaic virus
	Arka Tejaswi	Tolerant to chilli leaf curl virus
	Arka Yashasvi	Tolerant to chilli leaf curl virus
	Dr YSRHU- Kranthi	Resistant to chilli leaf curl virus
	Dr YSRHU-Chaitra	Tolerant to chilli leaf curl virus
	Dr YSRHU- Tanvee	Highly tolerant to chilli leaf curl virus
	Dr YSRHU-Siri	Tolerant to chilli leaf curl virus
	Kashi Tej	Tolerant to Anthrachrose, fruit rot disease and thrips
	Kashi Ratna	Tolerant to anthracnose and thrips
	Kashi Abha	Tolerant to anthracnose, CLCV, thrips and mites
	Kashi Sinduri	Resistant to anthracnose disease
	Indira Mirch-1	Resistant to bacterial wilt
	CH-27	Resistant to leaf curl virus, fruit rot and root knot nematodes
Okra	Arka Abhay	Tolerant to yellow vein mosaic virus
	Arka Anamika	Tolerant to yellow vein mosaic virus
	Kashi Chaman	Resistant to Yellow Vein Mosaic Virus and Leaf curl virus
	Kashi Shristi	Tolerant to Yellow Vein Mosaic Virus
	Kashi Lalima	Tolerant to Yellow Vein Mosaic Virus
	Kashi Vardaan	Resistant to Yellow Vein Mosaic Virus and Leaf curl virus
	Phule Vimukta	Resistant to Yellow Vein Mosaic Virus
Bottle gourd	Arka Ganga	Resistant to gummy stem blight
	Arka Shreya	Resistant to gummy stem blight
	Arka Nutan	Resistant to gummy stem blight
	Kashi Kundal	Resistant to Downey Mildew
	Kashi Kirti	Resistant to Downey Mildew
	Kashi Bahar	Tolerant to anthracnose, downy mildew and Cercospora leaf spot
Cucumber	Kasha Nutan	Resistant to Downey Mildew

Ridge gourd	Kashi Jyothi	Resistant to sponge gourd mosaic virus tolerant to Downey mildew and root knot Nematode
	Kashi Shivani	Resistant to Anthracnose and tolerant to downy & powdery mildew
	Garg-1	Moderately resistant to mosaic virus and downy mildew
Cowpea	Kashi Kanchan	Resistant to golden mosaic virus and Pseudocercospora cruenta
	Kashi Unnati	Resistant to golden mosaic virus and Pseudocercospora cruenta
	Kashi Sudha	Tolerant to golden mosaic virus and Pseudocercospora cruenta
French Bean	Arka Bold	Resistant to rust
	Arka Anoop	Resistant to rust and bacterial blight
	Arka Arjun	Resistant to Yellow Mosaic Virus
	Arka Sukomal	Resistant to rust
	Kashi Sampann	Tolerant to Golden Yellow Mosaic Virus
	Kashi Rajahans	Tolerant to Golden Yellow Mosaic Virus
Pea	Arka Ajit	Resistant to powdery mildew and rust
	Arka Apoorva	Resistant to powdery mildew and rust
	Arka karthik	Resistant to powdery mildew and rust
	Arka Sampoorna	Resistant to powdery mildew and rust
	Arka Priya	Resistant to powdery mildew and rust
	VP 434	Resistant to powdery mildew
	Kashi Samridhi	Resistant to powdery mildew
	Kashi nandini	Tolerant to leaf miner and pod borer
	Kashi Mukti	Resistant to powdery mildew
	Pant Sabji Matar-5	Resistant to powdery mildew
Dolichos Bean	Arka Prasidhi	Resistant to rust
	Kashi Kushal	Tolerant to Yellow Vein Mosaic Virus
	Kashi Sheetal	Tolerant to Yellow Vein Mosaic Virus
	Chhattisgarh Sem-1	Resistant to bean virus and rhizoctonia blight
Cassava	Sree Padmanabha	Resistant to cassava mosaic virus
	Sree Reksha	Resistant to cassava mosaic virus
	Sree Suvarna	Resistant to cassava mosaic virus
	Sree Sakthi	Resistant to cassava mosaic virus
	Sree Kaveri	Resistant to cassava mosaic virus

not only cause a major reduction in chemical pesticide or fungicide usage and slow down the rate of development of resistance to plant protection chemicals, but would also lead to increased activity of beneficial microorganisms, reduced pesticide residues in food and food products, and a much safer environment to live.

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