

Climate Change Impact on Whitefly (*Bemisia tabaci*) Population Infesting Tomato (*Lycopersicon esculentus*) in Sub-Himalayan India and Their Sustainable Management Using Biopesticides

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Abstract : Tomato (*Lycopersicon esculentus* L.) is an annual vegetable crop grown in the sub-Himalayan region of north east India throughout the year except rainy season in normal field cultivation. The crop is susceptible to various insect pests of which whitefly (*Bemisia tabaci* Genn.) causes heavy damage. Thus, a study on its occurrence and sustainable management is needed for successful cultivation. The pest was active throughout the growing period. During 38th standard week to 41st standard week that is during 3rd week of September to 2nd week of October minimum population was observed. The maximum population level was maintained during 11th standard week to 18th standard week that is during 2nd week of March to 3rd week of March with peak population (0.47/leaf) was recorded. Weekly population counts on white fly showed non-significant negative correlation ($p=0.05$) with temperature and weekly total rainfall where as significant negative correlation with relative humidity. Eight treatments were taken to study the management of the white fly pest such as botanical insecticide azadirachtin botanical extracts, *Spilanthes paniculata* flower, *Polygonum hydropiper* L. flower, tobacco leaf and garlic and mixed formulation like neem and floral extract of *Spilanthes* were evaluated and compared with the ability of acetamiprid. The insecticide acetamiprid was found most lethal against whitefly providing 76.59% suppression, closely followed by extracts of neem + *Spilanthes* providing 62.39% suppression. Spectrophotometric scanning of crude methanolic extract of *Polygonum* flower showed strong absorbance wave length between 645-675 nm. Considering the level of peaks of wave length the flower extract contain some important chemicals like Spirilloxanthin, Quercetin diglycoside, Quercetin 3-O-rutinoside, Procyanidin B1 and Isorhamnetin 3-O-rutinoside. These chemicals are responsible for pest control. Spectrophotometric scanning of crude methanolic extract of *Spilanthes* flower showed strong absorbance wave length between 645-675 nm. Considering the level of peaks of wave length the flower extract contain some important chemicals of which polysulphide compounds are important and responsible of pest control. Neem and *Spilanthes* individually did not produce good results but when used as a mixture they recorded better results. Highest yield (30.15 t/ha) were recorded from acetamiprid treated plots followed by neem + *Spilanthes* (27.55 t/ha). Azadirachtin and Plant extracts are biopesticides having less or no hazardous effects on human health and environment. Thus they can be incorporated in IPM programmes and organic farming in vegetable cultivation.

Keywords : biopesticides, organic farming, seasonal fluctuation, vegetable IPM

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