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Short Note

Compatibility of Confidence® (Imidacloprid 17.8% SL) with Some Chemical and Botanical Pesticides on Cotton, Bhendi and Chilli

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Experiments were conducted at the Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore to assess the compatibility of Confidence® (imidacloprid 17.8% SL) with other chemical pesticides on cotton, bhendi and chilli. The physical stability in terms of emulsion stability revealed that out of eight pesticides tested namely, azoxystrobin, wettable sulphur, carbendazim, spiromesifen, dicofol, neem oil, neem seed kernel extract and emamectin with imidacloprid 17.8% SL at 25 g a.i./ha, none of these products produced creaming matter or sediment, more than 2.0 ml at the top or bottom of the 100 ml cylinder. The results confirmed the physical stability of these pesticides with imidacloprid 17.8 % SL. The phytotoxic effects of these combination products on cotton, bhendi and chilli revealed that imidacloprid 17.8% SL at 25g a.i./ha with the above eight pesticides at recommended doses had not caused any phytotoxic symptoms such as injury to leaf tip and leaf surface, wilting, vein clearing, necrosis, epinasty and hyponasty.

Key words: Imidacloprid, compatibility, insecticides, fungicides, botanicals

Among the strategies adopted to combat pests, insecticides form the first line of defense in spite of their drawbacks. Most of the insecticides used on agricultural crops are based on quite limited number of chemically different classes. Of them, the most important inorganic insecticides that are used against these pests on crops belong to organophosphates, carbamates and synthetic pyrethroids (Pawar and Jadhav, 1993). Recently, it has been noticed that some of these insecticides recommended to control insect pests, not only had a shift in the status of their toxicity, but also cause resurgence of pests. Apart from these, monitoring data on conventional insecticides showed that certain amount of insecticide residues were present at detectable levels, occasionally persisted at concentrations above the standards established by EPA and the pests developed resistance (Kumar, 1998). Primarily, this is attributed to the application of insecticides at higher doses for want of effective control i.e. higher amount per unit area on the crops. Ultimately as a consequence, this has resulted in the presence of these insecticides at higher concentration in edible parts of the plant as well as in the environment.

In such situation, newer group of insecticides offer great scope as they maintain high toxicity to insects at lower doses and are not persistent as conventional group of insecticides. Imidacloprid, [1-(6-chloro-3-pyridyl-methyl)-N-nitroimidazolidin-2-ylideneamine], one such new compound belonging to neonicotinoid group developed by Nihon Bayer, Japan with the trade name of Confidor®, has superior performance on sucking pests such as leafhoppers, plant hoppers, whiteflies and aphids, certain coleopterans and micro lepidopterans at very low dosage with considerable residual activity and low mammalian toxicity (Elbert *et al.,* 1991). In India, Jaishree Agro Industries Private Limited, New Delhi has developed a newer indigenous formulation of imidacloprid 17.8% SL (Confidence®) against sucking pest complex of various crops. The present study was undertaken with Confidence® (imidacloprid 17.8% SL) on cotton, bhendi and chilli to study the compatibility of imidacloprid 17.8 % SL with other chemical pesticides.

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Materials and Methods

Emulsion stability test

Sample of imidacloprid 17.8% SL supplied by Jaishree Agro Industries Private Limited, New Delhi was subjected to physical test for emulsion stability either alone or after mixing with other chemical pesticides such as azoxystrobin, wettable sulphur, carbendazim, spiromesifen, dicofol, neem oil, neem seed kernel extract and emamectin.

Emulsion stability test was carried out for imidacloprid alone and for the combination products mentioned earlier as prescribed by Indian Standard specifications (IS, 1973). To 75 to 80 ml of standard hard water kept in a beaker at 30 $\pm$ 1 ^{0}C, candidate insecticide was added by means of pipette. The material was added to the standard hard water at

the rate of 25 to 30 ml per minute with the material pouring directly into the beaker and not along the sides. Standard hard water is defined as water, which provides a hardness of 342 ppm calculated as calcium carbonate. It was prepared by mixing 0.302 g calcium chloride and 0.139 g magnesium chloride in one litre of double distilled water.

The contents of the beaker were stirred with the glass rod at the rate four revolutions per second during addition. The diluted emulsion was made upto 100 ml mark with water and it was transferred immediately to a clean dry graduated cylinder. Then, the cylinder with its contents at 30 $\pm$ 1 ^{0}C was kept in a thermostat for 30 min. After the specified time, the volume of the creamed matter at the top and / or the sediment at the bottom was observed. The creaming matter or the sediment if any exceeded 2.0 ml at the top or bottom of the 100 ml cylinder was considered as unstable.

Biological (plant) compatibility test

For observing the visible phytotoxic effects of the combination products, MCU 5 cotton, NS 505 bhendi hybrid and CO 3 chilli were grown in pots. The experiment with the following treatments was conducted in a completely randomized block design and replicated thrice.

1. Imidacloprid 17.8% SL + Azoxystrobin (1 ml/l)
2. Imidacloprid 17.8% SL + Wettable sulphur (2 g/l)
3. Imidacloprid 17.8% SL + Carbendazim (1 g/l)
4. Imidacloprid 17.8% SL + Dicofol (2 ml/l)
5. Imidacloprid 17.8% SL + Spiromesifen (0.3 ml/l)
6. Imidacloprid 17.8% SL + Neem oil (5 ml/l)
7. Imidacloprid 17.8% SL + Neem seed kernel extract (50 ml/l)
8. Imidacloprid 17.8% SL + Emamectin (0.3 g/l)
9. Untreated control

The recommended level (0.02 ml/l) of imidacloprid was mixed with water and to this solution, the fungicides / acaricides / insecticides (mentioned above) at recommended concentrations were added and mixed thoroughly. The potted cotton, bhendi and chilli plants were sprayed with these solutions on 25 days after sowing / planting at the rate of 15 ml/plant.

The crops were observed on 1, 3, 5, 7, 10 and 20 days after treatment for the phytotoxic symptoms such as

a. Injury to leaf tip and leaf surface
b. Wilting
c. Vein clearing
d. Necrosis and
e. Epinasty and hyponasty, which were recorded on the following scale.

Results and Discussion

The results on the investigations carried out to study the physical stability in terms of emulsion stability revealed that out of eight pesticides tested namely, azoxystrobin, wettable sulphur, carbendazim, spiromesifen, dicofol, neem oil, neem seed kernel extract and emamectin with imidacloprid 17.8% SL

Rating	Phytotoxicity (%)
0	No Phytotoxicity
1	1-10
2	11-20
3	21-30
4	31-40
5	41-50
6	51-60
7	61-70
8	71-80
9	81-90
10	91-100

@ 25 g a.i./ha, none of these products produced creaming matter or sediment, more than 2.0 ml at the top or bottom of the 100 ml cylinder. The results confirmed the physical stability of these pesticides with imidacloprid 17.8 % SL.

Results on the investigations conducted to find out the phytotoxic effects of these combination products on MCU 5 cotton, NS 505 hybrid bhendi and CO 3 chilli revealed that imidacloprid 17.8% SL at 25g a.i./ha with the above said eight pesticides at recommended dose had not caused any phytotoxic symptoms such as injury to leaf tip and leaf surface, wilting, vein clearing, necrosis, epinasty and hyponasty.

The results of the present investigation derive strength from the report of Mote *et al.* 1994) who stated that seed treatment of imidacloprid along with captan or thiram was found to be compatible on okra and Kotliski (2001) who concluded that imidacloprid was found to be compatible and synergistic with most of the fungicides tested against *Delia antiqua* Meig.

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