



Compatibility of thiamethoxam 25 WG with selected Agro-chemicals on cotton

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ABSTRACT

Experiments were conducted at the Department of Agricultural Entomology, University of Agricultural Sciences, Dharwad to assess the compatibility of thiamethoxam 25 WG with selected agro-chemicals on cotton. The physical stability in terms of emulsion stability revealed that out of four chemicals tested namely, carbendazim, copper oxychloride, NAA, and MgSO₄ with thiamethoxam 25 WG at 0.2 g/litre, 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 agro-chemicals with thiamethoxam 25 WG. The phytotoxic effects of these combination products on cotton revealed that thiamethoxam 25 WG at 0.2 g/litre with the above four chemicals 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 on 60 and 90 old cotton crop.

Key words: Compatibility, Thiamethoxam 25 WG, Agro-chemicals and Cotton

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INTRODUCTION

Cotton cultivation in India requires large number of chemicals and sprays for managing different insect pests and diseases. It is often economical and convenient to apply a mixture of two or more pesticides and nutrients when a wide range of pests or maladies are to be managed at a time. The knowledge about compatibility of agrochemicals is very vital in selecting the compatible combination for effective management of insect pests, diseases and weeds. Combined application of pesticides is a labour saving short cut method, but an understanding and knowledge of pesticide compatibility is essential in order to avoid problems which may arise from combinations of some pesticides. Pesticide combinations may show physical, chemical or phytotoxic incompatibility causing undesirable results [1]. Compatibility is the ability of two or more components of a pesticide mixture to be used in combinations without impairment of toxicity, physical properties or plant safety of either of the components. Whereas, 'incompatibility' is a condition that may occur when two or more pesticides are used in combination with resultant loss or impairment of effectiveness of either component, development of undesirable physical properties. Negative effects can occur such as deactivation of active ingredient often occurs, reduced pest control, increased damage to non-target plants (phytotoxicity) and incompatibility problems between materials [2]. Hence, knowledge on the compatibility is necessary to be familiar with the efficacy of mixed chemicals in managing insect pest and diseases in field condition. In this background, a field experiment was designed to know the compatibility of a newer insecticide, thiamethoxam 25 WG with other agro-chemicals on cotton.

MATERIALS AND METHODS

Emulsion stability test: Thiamethoxam 25 WG was subjected to physical test for emulsion stability either alone or after mixing with fungicides / fertilizer / growth regulator such as carbendazim, copper oxychloride, NAA, and MgSO₄. Emulsion stability test was carried out for spinetoram alone and for the combination products mentioned earlier as prescribed by Indian Standard specifications [3]. Standard hard water was prepared by dissolving 0.304 g anhydrous calcium chloride (CaCl₂) and 0.139 g magnesium chloride (MgCl₂) in one liter of distilled water. This solution had hardness equivalent of 342 ppm calcium carbonate and was used to prepare the insecticide test solutions. To such formulated

insecticide suspension (30 ml), 30 ml of either of the proposed combination chemical (carbendazim / copper oxychloride / NAA / MgSO₄) was added separately and transferred to a clean dry graduated cylinder and the volume was made upto 100 ml with standard hard water. The mixture was shaken well and kept in a thermostat at 30±1°C for 1 h without any disturbance. The observations were taken visually on the formation of creaming matter or sediment not exceeding 2.0 ml at the top or bottom of the 100 ml cylinder, respectively which was considered as the criteria for the compatibility.

Phytotoxic (plant) compatibility test: A field trial was conducted to evaluate the bioefficacy of combinations of thiamethoxam 25 WG with fungicides / fertilizers, as foliar application on Bt cotton. The experiment was laid out in a Randomized Block Design (RBD) at MARS, Dharwad during *kharif*, 2014-15 season. The experiment consisted of 10 treatments replicated thrice (shown in following Table 1). A cotton hybrid, RCH-2 Bt susceptible to insect pests and diseases was chosen and raised in plots of 5.40 x 2.70 metre with 90 x 60 cm row to row and plant to plant spacing. Crop was raised by following package of practices. For the experiment, two sprayings were carried out using hand operated pneumatic knapsack sprayer with 500 litres of spray fluid/ha at 60 and 90 days after sowing.

Table 1: Treatments details

| Sl. no | Treatments | Dosage (g/ml) per litre |
|--------|---|-------------------------|
| 1 | Thiamethoxam 25 WG | 0.2 g |
| 2 | Thiamethoxam 25 WG + Carbendazim 50 WP | 0.2 g + 1.0 g |
| 3 | Thiamethoxam 25 WG + Copper oxychloride 50 WP | 0.2 g + 2 g |
| 4 | Thiamethoxam 25 WG 50 WP + NAA | 0.2 g + 20 ppm |
| 5 | Thiamethoxam 25 WG + MgSO ₄ | 0.2 g + 10 g |
| 6 | Carbendazim 50 WP | 1.0 g |
| 7 | Copper oxychloride 50 WP | 2 g |
| 8 | NAA | 20 ppm |
| 9 | MgSO ₄ | 10 g |
| 10 | Untreated check | - |

The observations were also made at 3, 7 and 14 days after treatment on randomly selected 5 plants in each plot on phytotoxicity at 0-10 scale on following symptoms *i.e.* injury to leaf tip and leaf surface, wilting, vein clearing, necrosis and epinasty and hyponasty [4].

Table 2: Phytotoxicity at 0-10 scale

| Scale | Per cent phytotoxicity | Scale | Per cent phytotoxicity |
|-------|------------------------|-------|------------------------|
| 0 | No phytotoxicity | 6 | 51-60 |
| 1 | 1-10 | 7 | 61-70 |
| 2 | 11-20 | 8 | 71-80 |
| 3 | 21-30 | 9 | 81-90 |
| 4 | 31-40 | 10 | 91-100 |
| 5 | 41-50 | | |

RESULTS AND DISCUSSION

The results on the investigations carried out to study the physical stability in terms of emulsion stability revealed that out of agro-chemicals tested namely, carbendazim, copper oxychloride, NAA and MgSO₄ with thiamethoxam 25 WG @ 0.2 g/litre, 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 Thiamethoxam 25 WG with selected agrochemicals. The findings of the present study are in agreement with the findings of Senthil Kumar and Regupathy [5] who revealed that both thiamethoxam and imidacloprid were found to be physically compatible with the nutrients (urea, di-ammonium phosphate & muriate of potash) and fungicides (bordeaux mixture & propiconazole) by means of emulsion stability test.

Results on the investigations conducted to find out the phytotoxic effects of these combination products on RCH-2 Bt cotton revealed that Thiamethoxam 25 WG at @ 0.2 g/litre with the above agro-chemicals 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 at 60 and 90 days old cotton crop. It might be the first report in studying the compatibility of Thiamethoxam 25 WG with selected agro-chemicals on cotton in India.

The results proved that all the tested treatments were physically and phytotoxically compatible with each other and hence, these combinations can be takeover to the semi-field and field conditions for further tests like biological (Efficacy against insect pests and diseases, and effect on natural enemies) compatibility studies.

Table 3: Phytotoxic compatibility of diafenthiuron 50 WP with selected agro-chemicals on cotton

| Treatments | Mixture | Phytotoxicity ratings | | | | | |
|-----------------|---|-----------------------|---------|---------------|----------|----------|-----------|
| | | Leaf tip injury | Wilting | Vein clearing | Necrosis | Epinasty | Hyponasty |
| T ₁ | Thiamethoxam 25 WG | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₂ | Thiamethoxam 25 WG + Carbendazim 50 WP | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₃ | Thiamethoxam 25 WG + Copper oxychloride 50 WP | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₄ | Thiamethoxam 25 WG + NAA | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₅ | Thiamethoxam 25 WG + MgSO ₄ | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₆ | Carbendazim 50 WP | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₇ | Copper oxychloride 50 WP | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₈ | NAA | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₉ | MgSO ₄ | 0 | 0 | 0 | 0 | 0 | 0 |
| T ₁₀ | Untreated check | 0 | 0 | 0 | 0 | 0 | 0 |

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