

Field scale study on efficacy of miticide, against two spotted mites in Kenyan agro climatic zone

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Abstract: Two spotted spider mites (TSM) is an incident pest problem in Kenyan roses cultivators due to the climatic conditions. Paradigm shift from chemical to bio pesticide is at most important in order to reduce the threat to the environment and human health. This research is aimed to confirm the potency of contact botanical pesticide to be used as bio control against spider mite at Kenyan agro climatic zone. Commercially available and proven chemical pesticides were used to access the efficacy of this botanical pesticide. M Impact, a botanical pesticide was analyzed for its effect on two spotted spider mites at field level on one acre one green house and its effect was compared with the available chemical pesticides. M impact was found to be most effective in terms of its period of action and potency against two spotted mites, while other chemical miticides showed delayed effect due to their different mode of action.

Keywords: Rose, Kenya, M impact, Two spotted mite

I. Introduction

Rose is major crop in Kenyan floriculture business involving 61% share in floriculture. Kenya is the leading exporter of rose cut flowers to the European Union (EU). According to horticulture-validated report 2012, the main cut flowers grown in Kenya are roses (53.6%), which is highest amongst the other floriculture values. The main production areas are around Lake Naivasha, Mount Kenya, Nairobi, Thika, Kiambu, Athi River, Kajiado, Kitale, Nakuru, Kericho, Nyandarua, Trans Nzoia, Uasin Gichu and Eastern Kenya.

Major anthropogenic activities in Kenyan agro climatic conditions are due to shift in temperature and rainfall. Regular pest control methods involve chemical pesticides having high potency and fast action against the pest. Two-spotted spider mite (TSM), Tetranychus urticae Koch, 1836, belongs to the group of acarines known as Acariformes, in the suborder Prostigmata, and the family Tetranychidae [1]. Concerns about the use of agrochemical control measures have led to search for alternative control measures to suppress TSM populations, including the use of biological control, particularly by applying predatory phytoseiulus mites [2]. For a sustainable solution of agricultural pest botanical pesticides are known to be a recommended product. Numbers of characters like its biodegradable nature systemicity after application, favorable safety profile are used for this choice over the chemical pesticides [3]. Nonetheless, the control provided by predatory mites is often insufficient and supplementary sprays with selective chemical acaricides have been required [4]. Botanical pesticides have been shown to be effective at reducing spider mite populations. For example, Cote et al. 2002 found that one of the botanical preparations caused significant mortality to spider mites, 40% dead compared to less than 10% dead in control. The effect of these pesticides however was short-lived, as mortality was equal in control and treatments by 3 days. These botanical pesticides were not toxic to predator mites [5].

Considering this present study was aimed towards checking the efficacy of the botanical pesticide M impact against the regular chemical pesticides. Since chemical pesticides are known to have direct effect on pests and its potency is well recorded, it was thought worthwhile to compare efficacy of botanical pesticide with known chemical based pesticides. Well defined and proven chemical pesticides (mentioned in Table 1) were taken along with botanical pesticide M impact.

II. Materials and methods

One acre green house with Tetranychus urticae affected rose (variety- Gold strike) plantation at Athi River, central Kenya was selected for the efficacy trials. Total plot was divided in eight plots using randomized block design and labeled as per the treatment along with water control. Treatment was given with various pesticides in spray method at specified concentrations i.e. Kelthane (1.5 ml), Vertimec (0.4 ml), Magister (1ml), Omite (1ml), Missile (0.5 gm.), M-Impact (1ml) per liter of water. pH of the spray solution was maintained between 5 to 7 with the help of sulphuric acid (1N). Details are mentioned in Table 1.

Table 1: Details of the products and their concentration used for control of mites

Product	Active Ingredient	Type	Dose/lit	Company
Kelthane	Dicofol	Chemical	1.5ml	Insecticides India Ltd.
Vertimec	Abamectin	Chemical	0.4ml	Syngenta India
Magister	Fenazaquin	Chemical	1ml	Dow Agro Sciences
Omite	Propergite	Chemical	1ml	Dhanuka
Missile	Abamectin	Chemical	0.5gm	Crystal Crop Protection Pvt. Ltd.
M-Impact	Botanical extracts	Botanical/biopesticide	1ml	GreenVision Life Sciences Pvt. Ltd

Power spray with pressure of 20 bars was applied during the treatment. Water was used as experimental control. Results were taken in terms of count. Immediate count was taken and continued for various time interval. Observations for the density of mites in terms of total number of mites per plant at different time intervals up to 12 hours were taken. Plants were also checked morphologically for any phytotoxicity symptoms.

III. Results

Continuous reduction in the density of TSM was observed after the spray on infected rose plant. Although chemical treatments are reducing the mite density, botanical miticide is showing highest mortality on two spotted spider mite. Hence it was further evaluated for the phytotoxicity on plants using higher concentrations. It was observed that more than 3ml/liter dose shows scorching symptoms on tender leaves.

Mites:

Area treated: One acre Greenhouse

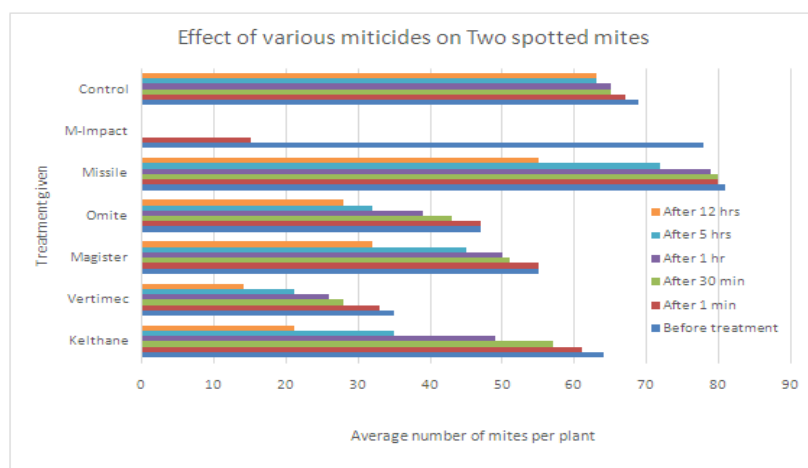


Figure 1 Effect of different miticides on Spider mite control at various time intervals (all values are average values)

IV. Discussion

The effect of sprays on mite populations varied over the seventypes of treatment heads. In each of the chemical treatment even after 12 hours reduction was observed up to nearly 50%. i.e. rate of mortality in all other chemical treatment is approximately up to 50 %. Botanical pesticide used was M impact which shows 100% mortality within one minute of contact period. This reflects very high potency of this pesticides. Mechanism of action on mites was different using chemical and bio pesticides. Most of the chemical pesticides affect are observed once the mite consumes the chemicals. M impact is a botanical pesticide and has contact poisoning effect. This may be areason for getting highest mortality in M impact and slow but steady reduction of mites in chemical pesticides used during the study.

V. Conclusion

M Impact destroys all mites present on the plant in very less time and did not cause any phytotoxicity in a rose plant. In general, M impact was found to be a suitable option for field-scale integrated pest management programs for controlling two spotted spider mites on greenhouse horticultural plant i.e. rose plant at Kenyan agro climatic zone.

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