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SAP FEEDERS AND THEIR MANAGEMENT IN MULTIPLICATION GARDEN OF *MELIA DUBIA*

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Abstract

Fast growing native tree species like *Melia dubia* is in high demand by paper and plywood industries. Mass production of propagules of this species is carried out through vegetative multiplication. Mealy bug *Ferrisia virgata* and red spider mite *Tetranychus utricae* periodically infest *M. dubia* in the vegetative multiplication garden and in nursery. This hampers collection of sufficient number of healthy branch cuttings of *M. dubia* for periodic production of propagules. The paper reports the management measures for sap feeders infesting *M. dubia* in mother beds of multiplication garden.

Keywords: Vegetative multiplication, sap feeder, pest management.

Introduction

Melia dubia is a fast growing tree species widely planted for plywood, packing cases, cigar boxes, ceiling planks, building purposes and also for agriculture implements. Because of the high calorific value it is used as fire wood for power generation and has opened new opportunities for small and medium bio mass power generation projects. The various parts of *M. dubia* plant were reported to be used by tribals for curing various ailments. *M. dubia* seed oil is used for a variety of purposes like soap industries, lubricants and illuminants besides bio diesel. Multiplication and mass propagation of the species is required due to high demand by paper and plywood industries for raising plantation.

Seedling production through seed route tends to be difficult due to some seed problems of *M. dubia*. Vegetative multiplication through mini cuttings has been standardized for mass production of propagules.

In mini cutting method branchlets developing in the stumps on mother bed are periodically cut and maintained in mist chamber for mass multiplication of the species. Mealy bug *Ferrisia virgata* and red spider mite Tetranychus utricae periodically infest *M. dubia* in nursery and young saplings (Regupathy and Ayyasamy, 2013). Nymphs and adults of *F. virgata* are protected by the waxy coating on their body which repels water and fluids. Similarly, the mite *T. utricae* creates a layer of silken net work below the leaf which will also act as a barrier. Severe infestation by these sap feeders results in stunted growth of branches and chlorosis particularly in case of mite infestation. This hampers collection of sufficient number of healthy branch cuttings of *M. dubia* for periodic production of propagules. Therefore, it is important to identify more eco-friendly and economically viable method of sap feeding insect management in mother bed chamber of *M. dubia*. This paper reports the management

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measures for sap feeders infesting *M. dubia* in mother beds of multiplication garden.

Materials and Method

Insect infestation assessment

Periodic surveys were conducted in the mother bed chamber maintained at the Institute of Forest Genetics and Tree Breeding, Coimbatore, Tamilnadu to locate pest infestation. Discolored or malformed or curled leaves were identified. Samples were collected for lab study. The observations on frequency and intensity of infestation were recorded every 30th day for a period of 180 days. According to Jacob (2008), mother beds were divided into uniform blocks of 2ft x 2ft consisting of approximately 20 plants in each block. Percentage of plants infested and intensity of attack per plant was assessed. Numbers of plants with live scale insect colonies and number of mites per leaf were counted.

Preparation of plant based extract and treatment

The clean washed leaves of Justicia adhatoda was shade dried and powdered using mixer and sieved through kitchen strainer. 50gm of plant material was extracted with 300ml of water and boiled for 45 minutes. After cooling the solution is filtered through muslin cloth. The extracts were individually added with Neem, Pongam oil in the proportion of 85ml: 15ml. 15% emulsion of Neem and Pongam oil procured from local market was prepared with water. Few drops of Teepol were also added for all extracts as a fixative agent. The prepared combination plant extract were shaken well during application. Thiamethoxam (400mg/lit) was used as test control. Blocks in mother bed were given treatments with 5 replications for each treatment. Control blocks were treated with water only. Numbers of plants with live scale insect colonies and number of dead mites per leaf were counted after 24hrs treatment.

Results

Assessment of the intensity and frequency of infestation showed that both scale and mite infestation in mother beds of *M. dubia* occurred 20-25 days intervals for scale and 14-17 days for mites. Intensity of infestation by mite was observed to be very high during rainy months. With reduced temperature only mite population tends to exist (**Fig. 1**). Comparison of different treatments with plant based extracts showed that mixture of *J. adhatoda* leaf extract with Pongam oil (85:15) significantly reduced the percent plants with live colonies of scale insect. This was followed by Neem oil treatment, pesticide thiamethoxam, Pongam oil and *J. adathoda* and Neem oil mixture (**Fig 2**). In the case of mite infection Neem oil tends to reduce the average number of mite/leaf followed by Thiamethoxam, Pongam oil and *J. adhatoda* and Pongam oil mixture (**Fig. 3**).

Discussion

Plants possess various chemicals which play an important role in the behavior of phytophagous insects. Such chemicals can act as antifeedants (Koul, 1982) or as growth regulators (Koul, 1983) or can also kill the insects (Casida, 1976). Many plant based extracts have been shown to have adverse effects against a variety of insect pests. During the last few decades there have been increasing focuses on plant based products to manage insect pests in crops (Devi and Gupta, 2000) in order to reduce dependence on synthetic pesticides and due to concerns on environmental issues. Attempt has been made in the present study to observe the effectiveness of plant based extracts for management of sap feeding pest of *M. dubia*.

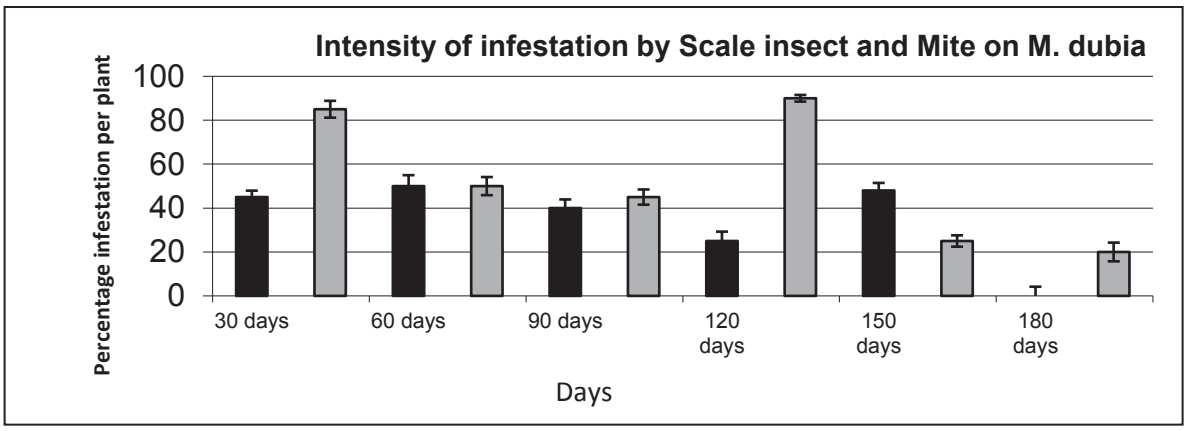

Fig. 1: Intensity of infestation by Scale insect and Mite on *M. dubia*

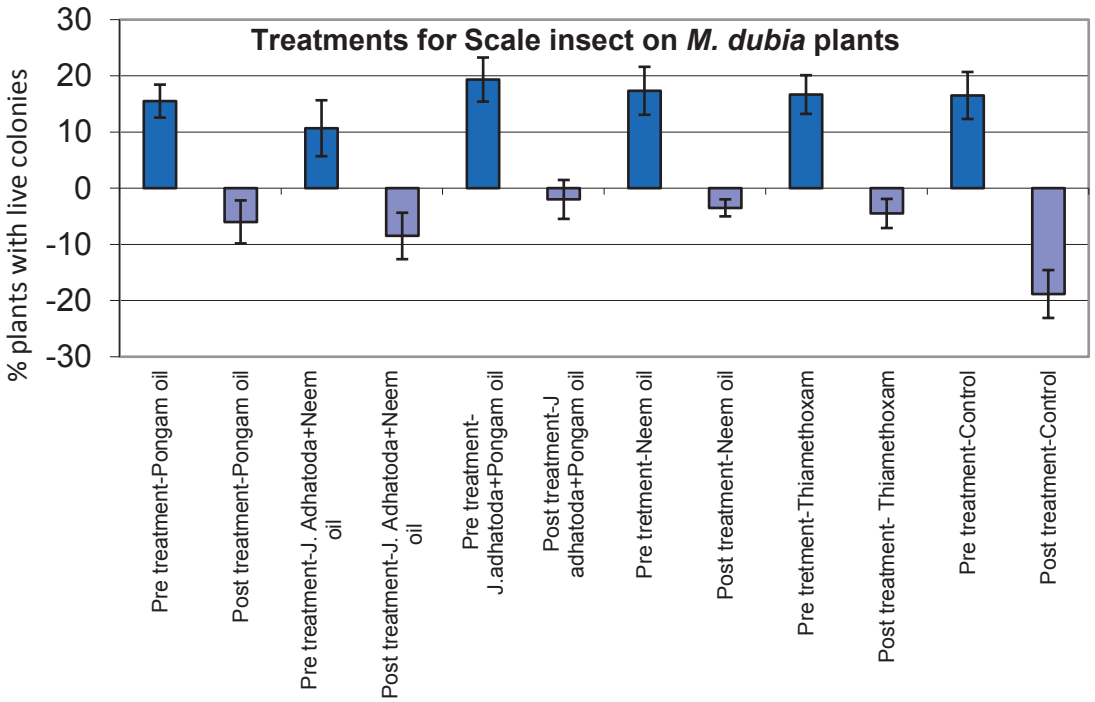

Fig. 2: Treatments for Scale insect on *M. dubia* plants

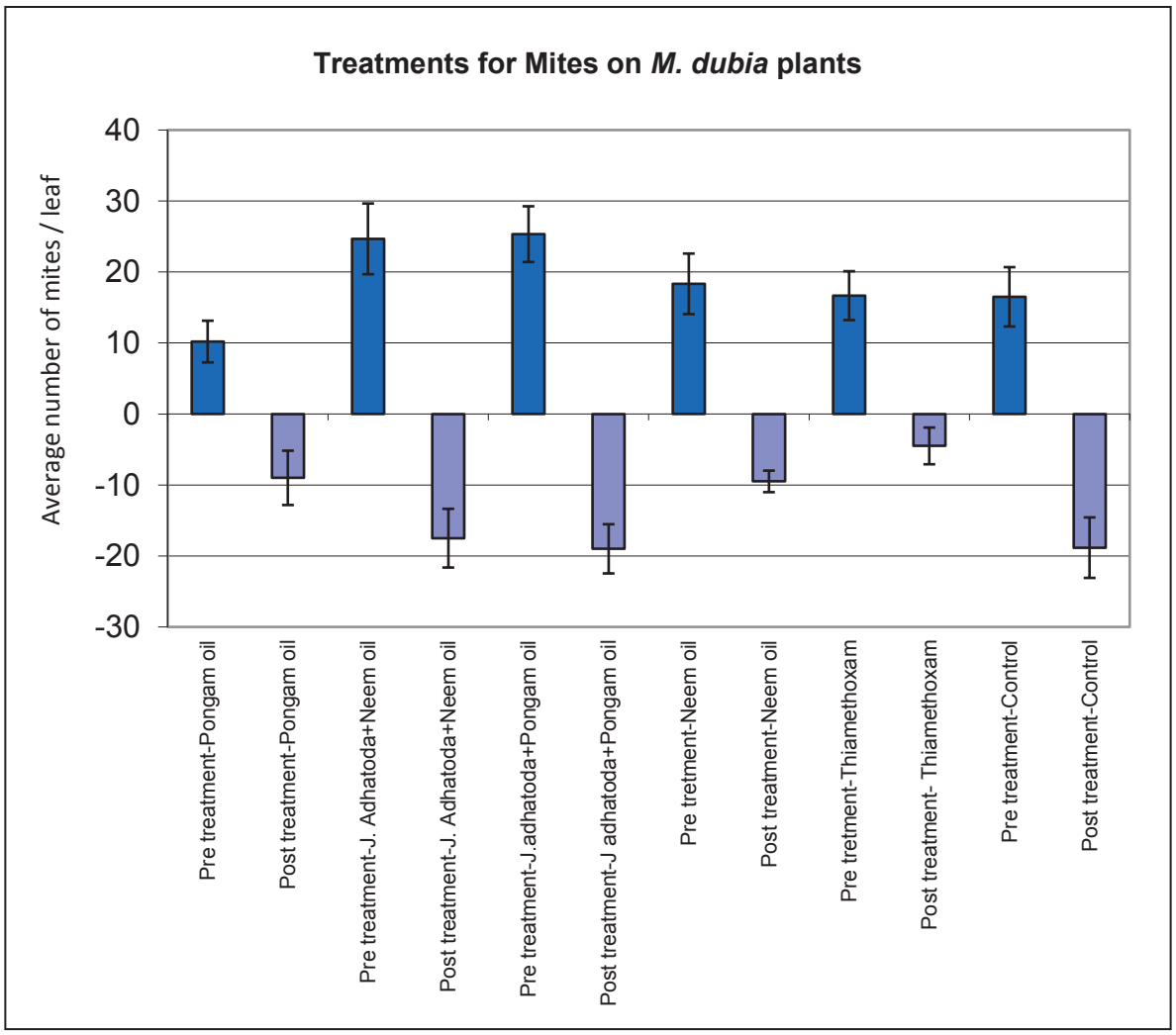

Fig. 3: Treatments for Mites on *M. dubia* plants

In the present study reduction of scale insect population demonstrates the insecticidal effect of combination of *J. adhatoda* and Pongam oil. Feeding deterrence of *J. adhatoda* alcohol extract against *Aulocophora foveicollis* and *Epilachna vigintioctopunctata* (Saxena *et al.,* 1986) as well as crude methanolic extract against *Spodoptera littura* have been demonstrated (Sadek, 2003). Hafifa and Ali (2016) also showed insecticidal effect of crude extract of *J. adhatoda* against aphid, Brevicoryne brassicae. Use of Pongam oil as an insecticide is widespread (Kumar and Singh, 2002). Combination of Pongam oil with plant extracts was effective against *Myzus persicae* (Elena *et al.,* 2014). Mortality was high in *F. virgata* colonies in *M. dubia* when treated with *J. adhatoda* and Pongam oil mixture.

Similarly, in the present study Neem oil tends to be effective in *T. utricae* population management in *M. dubia*. Neem products have been demonstrated to reduce infestation of mealy bug species (Daane and Bentley, 2007). Neem oil and various additives were effective in reduction of 3 sucking pests of tea (Roy and Gurusubramaniam, 2011). Sreerag and Jayaprakas (2014) demonstrated the effectiveness of a mixture of locally available Neem oil and leaf extract of Cassava against mealy bug *Paracocus marginatus* and *Aphis crassivora*. *T. utricae* is a very important pest causing serious damage to vegetables, flowers and fruit crops. Neem seed kernel extracts and its formulations are reported to cause mortality, feeding deterrency and reproductive capacity of mites (Monsuer and Aschen, 1983; Monsuer *et al.,* 1993; Dimetry *et al.,* 1993). Erdogan *et al.* (2012) showed the efficacy of 5 plant extracts on *T. utricae*. Mortalities were high in extracts from *Albizia coreana*, *Pyracantha angustifolia* and *Ligustrum japonicum* (Kim *et al.,* 2005).

The present study reveals that locally available neem or Pongam oil in combination with *J. adhatoda* will be an effective method to manage scale and mite infestation in mother bed chamber of *M. dubia*.

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