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Potential of Selected Plants as Ipm Components Against *Leptocybe invasa* Fisher & La Salle

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Introduction

Leptocybe invasa is an invasive, gall-inducing insect pest of *Eucalyptus* trees (Myrtaceae). It lays eggs in Eucalyptus plant tissue, where it develops for about 128 days before emerging out as an adult. Emergent adults have a life span of four days during which time they lay eggs into new Eucalyptus tissues. It was first reported in East Africa in western Kenya and eastern Uganda in 2002. By 2007 it had spread to southern parts of Africa, including South Africa (Mendel *et al*., 2004; CABI, 2007; Gupta & Poorani, 2009; Nyeko *et al*., 2009). Eucalypts are important multipurpose tree species that is extensively grown by many farmers in rural areas. *Leptocybe invasa* pest attack, however, is one of the constraints to Eucalypts growing in the region (Mutitu *et al*.,2007). There is need to develop an array of techniques for use in the integrated control of the pest. This study reports the potential of selected plants as IPM components against *Leptocybe invasa* Fisher & La Salle. The plant species studied were Lion's ear, *Leonotis nepetifolia* (Lamiaceae); Dwarf marigold, *Schkuria pinnata* Kuntz ex Thell (Asteraceae); and *Tagetes erecta* L. (Asteraceae). Specific objectives were to determine: (1) the efficacy of the three plant species as IPM components against *L. invasa*, (2) the preferred position on *E. saligna* for oviposition by *L. invasa*, and (3) the effect of the three companion plant species on growth of *E. saligna* seedlings.

Materials and Methods

Field materials for these studies were obtained from Kisumu County (Kenya) with the following site characteristics: Altitude: 1130 – 1835 m.a.s.l.; Mean annual rainfall: < 1000 - 1630 mm; Mean annual maximum temperature: 25^0 – 30 ^{0}C; Mean annual minimum temperature: 9^0 – 18 ^{0}C. Laboratory and green house experiments were conducted at University of Eldoret in Uasin Gishu County (Kenya) with the following site characteristics: Altitude: 1200 – 2100 m.a.s.l.; Mean annual rainfall: 960 mm; Mean annual maximum temperature: 24^0 – 26 ^{0}C; Mean annual minimum temperature: 6^0 – 10 ^{0}C.

Within a green house, fifty muslin cloth cages were set in a completely randomized design (CRD) with each cage enclosing potted seedlings of healthy *E. saligna* either mixed with each one of the test plants in alternating rows or enclosed alone. A total of 50 unsexed adults were introduced into each cage over a successive period of 5 days (10 adults daily). The insects were then confined with the plants for two weeks before the cages were removed to minimize cage effects on plant growth. The herbaceous plants were monitored for five months for gall development. There were five groups (four treatments and a control) in total: That is, *E. saligna* and *L. nepetifolia* seedlings with *L. invasa*; *E. saligna* and *S. pinnata* seedlings with *L. invasa*; *E. saligna* and *T. erecta* seedlings with *L. invasa*; *E. saligna* with *L. invasa* and *E. saligna* alone (control). Height (Ht) and root collar diameter (RCD) growth of *E. saligna* were measured weekly for five months while the number of galls occurring on leaf mid-ribs, petioles and twigs

of the seedlings were recorded for three months from the onset of gall induction. Data on height (cm), root collar diameter (mm) and number of galls that developed on *E. saligna* were subjected to ANOVA at 95 % confidence interval and means separated by LSD using STATGRAPHICS Plus software.

Results and Discussion

Mean gall count on *E. saligna* enclosed with *Tagetes erecta* as companion plant was the lowest at 4.2 ± 0.8 galls per seedling compared to 10.8 ± 1.7 galls per seedling where *E. saligna* seedlings were exposed to the insect pest without any companion plant (Figure 1). Magnitude of gall counts where *E. saligna* seedlings had companion plants than where the seedlings had no companion plants indicated the level of efficacy of the different companion plants studied. Low mean gall counts indicated high efficacy of the companion plants and vice versa. Percent efficacy of the companion plants were as follows: *T. erecta* (58%), *S. pinnata* (37%), *L. nepetifolia* (16%). Thus the most effective companion plant was *T. erecta* followed by *Schkuria pinnata* with which a mean of 6.0 ± 1.3 galls per *E. saligna* seedling was recorded.

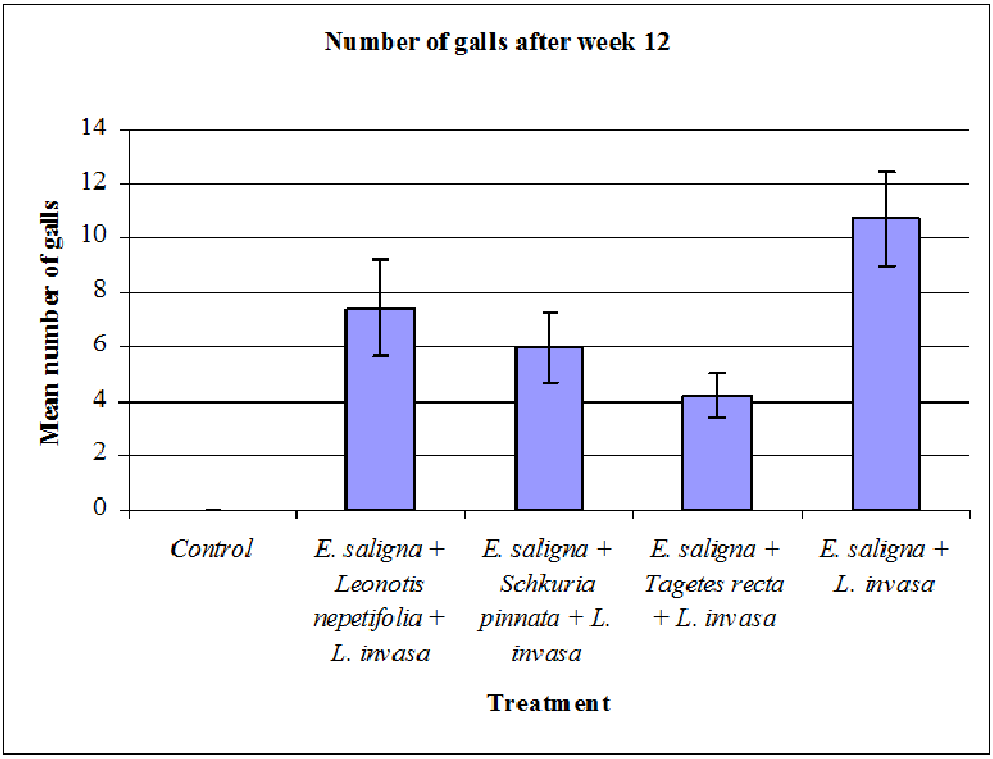

Figure 1: Mean gall count on *E. saligna* grown together with different herbaceous plants

The preferred position on *E. saligna* for oviposition by *L. invasa* was leaf mid-rib, followed by leaf petiole and twigs respectively (Figure 2). Leaf mid-ribs and petioles contain vascular tissues from where the insect larvae can derive nutrients for their growth and development. It is at these parts of the plant tissue that the endoparasitic insects can be reached when systemic insecticides are used as means of pest control.

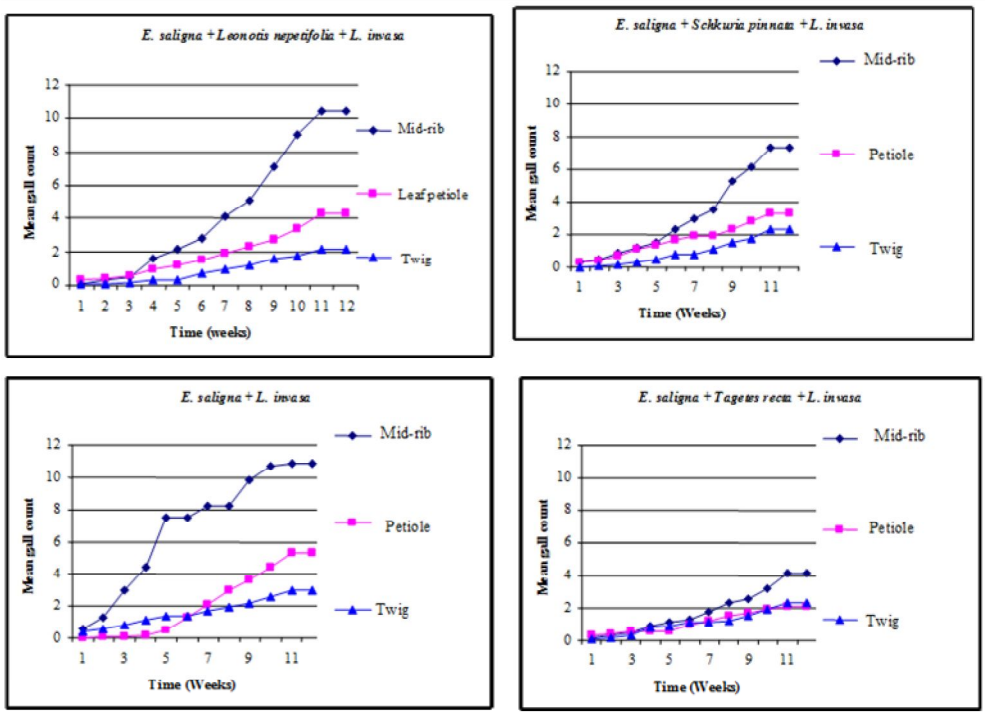

Figure 2: Mean gall count on mid-rib, petiole and twigs of *E. saligna* when grown together with different herbaceous plants

Effects of the companion plants on height growth (Ht) and root collar diameter (RCD) of *E. saligna* seedlings are presented in figures 3 and 4 respectively. Ht (cm) and RCD (mm) of control *E. saligna* seedlings were 139 cm and 5.1 mm respectively. *Tagetes erecta* had more negative effect on Ht and RCD of *E. saligna* seedlings as compared to *Schkuria pinnata*, that is 55.8 cm and 2.6 mm compared to 124.2 cm and 4.3 mm respectively (Figures 3 and 4).

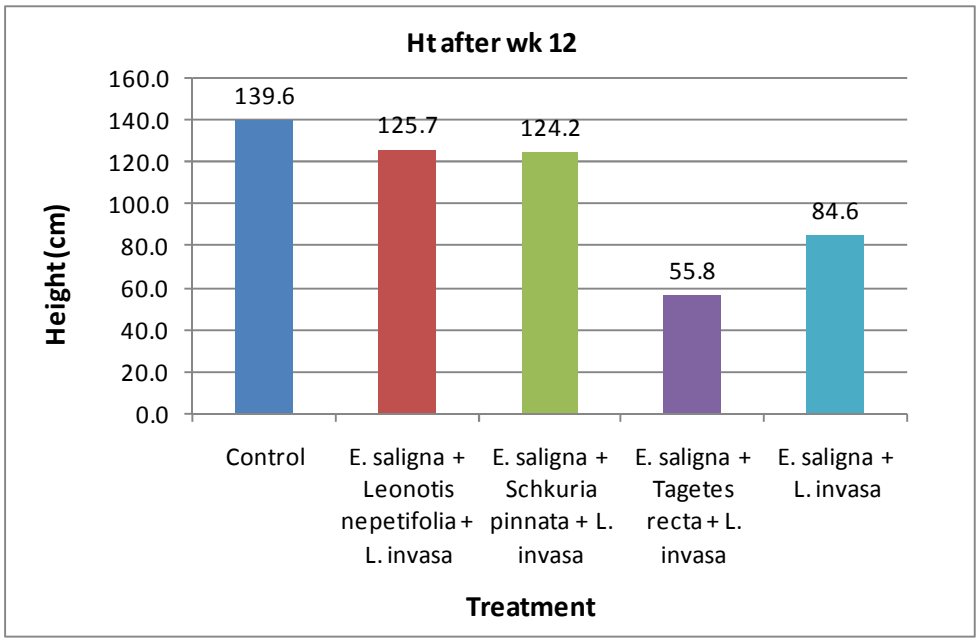

Figure 3: Effect of the companion plants on Height growth (cm) of *Eucalyptus saligna* seedlings

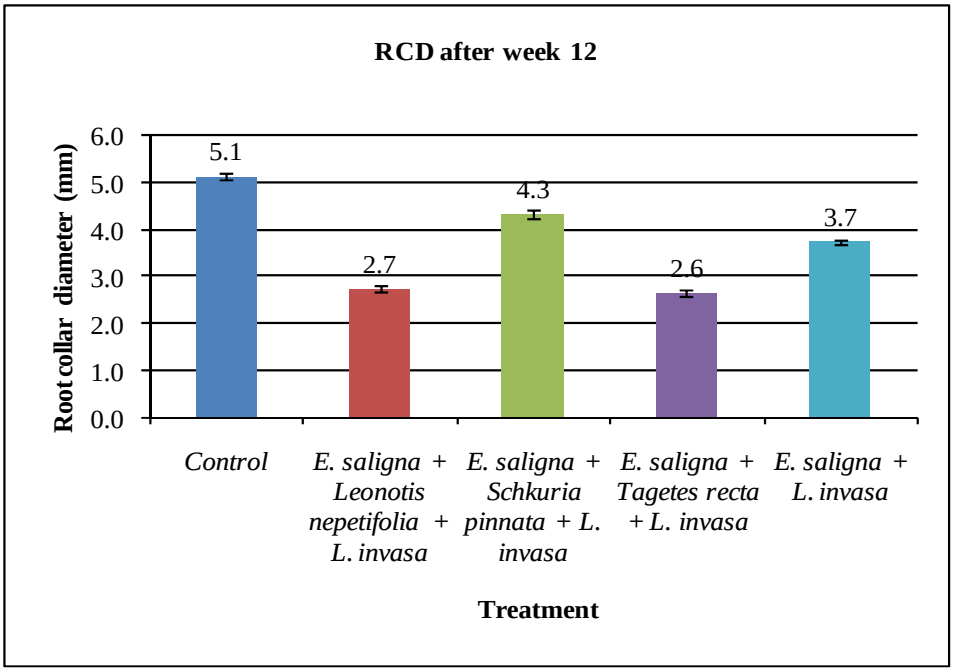

Figure 4: Effect of the companion plants on root collar diameter (mm) of *Eucalyptus saligna* seedlings

Conclusions and Recommendation

The three plant species studied were effective in reducing damage to *E. saligna* seedlings by *L. invasa* insect pest when used as companion plants and the most effective one was *T. erecta*, which also negatively affected growth of *E. saligna* seedlings while *S. pinnata* had the least effect on growth of *E. saligna* . *L*eaf mid-rib was the most preferred position of attack by *L. invasa.* This study recommends the use dwarf marigold, *Schkuria pinnata* Kuntz ex Thell (Asteraceae) as companion plants to *E. saligna* sedlings as part of IPM strategy against *L. invasa* insect pest. The study also recommends field trials with *S. pinnata* as companion plant with *E. saligna* seedlings against *L. invasa* pest.

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