Indian J. Weed Sci. **40** (1 & 2) : 70-72 (2008)

Management of *Mimosa invisa* Mart. using Post- emergence Herbicides

P. K. Jayasree and C. T. Abraham
Department of Agronomy
Kerala Agricultural University,Thrissur-680 656 (Kerala), India

ABSTRACT

Glyphosate applied at 0.6 kg/ha at active vegetative stage caused yellowing and drying up of *Mimosa invisa*. 2, 4-D at very high dose (5 kg/ha) even though caused epinasty was ineffective. Paraquat applied at 1 to 1.2 kg/ha at active vegetative stage was effective, but the labour and time requirement for efficient spraying of the contact herbicide was very high. All the herbicides applied at seedling stage were ineffective because of fresh germination from seed bank. The best chemical for controlling *M. invisa* was glyphosate @ 0.6 kg/ha and best time of application was active vegetative stage (100 days after germination).

Key words : Invasive weed, creeping sensitive plant, herbicide, weed management

INTRODUCTION

Mimosa invisa Mart., called giant sensitive plant or creeping sensitive plant is an alien weed from Tropical America, spreading fast in Kerala in the non cropped vacant lands, pastures and in crops like sugarcane, banana, pineapple, tea and other plantation crops. Since its first report from Kerala (Nair, 1964), it has become highly competitive, capable of smothering the natural vegetation and adversely affecting the floral diversity of the area of infestation (Muniyappan and Virakthamath, 1993). The rapid vegetative growth and spiny nature make control of the plant by manual methods difficult. Very few reports regarding the use of post-emergence herbicides on *M. invisa* are available. Attempts to control *M. invisa* using 2,4-D and dinitro butyl phenol (Dinoseb) in Brazil were not successful (Lew, 1993). Experiments conducted at Kerala Agricultural University using glyphosate @ 0.2 kg/ha resulted in 50% control (Anonymous, 2003). A field experiment was, therefore, laid out to assess the efficiency of the common post-emergence herbicides to control *M. invisa*.

MATERIALS AND METHODS

The experiment was conducted during 2003 and 2004 in the *M. invisa* infested pastures of Kerala Agricultural University, Livestock Farm and Fodder Research Station, Mannuthy. The naturally infested field was divided into plots by sickle weeding, so as to create pathways and divide the area into plots of size 5 x 4 m. The design was simple randomised block design with 19 treatments in three replications. Three post emergence herbicides 2, 4-D (0.5, 1, 2, 3, 4 and 5 kg/ha), glyphosate (0.2, 0.4, 0.6, 0.8, 1.0 and 1.2 kg/ha) and paraquat (0.2, 0.4, 0.6, 0.8, 1.0 and 1.2 kg/ha) were compared with unweeded control. These treatments were tested at two different growth stages of *M. invisa* viz., seedling stage (45 days after germination) and active vegetative stage (100 days after germination) separately and the effects were compared. The chemicals were sprayed with an Aspee backpack sprayer fitted with flood jet nozzle using a spray volume of 500 l/ha at seedling stage and 600 l at active vegetative stage in order to ensure uniform coverage. The number of new shoots produced and their dry weight per unit area at 30 and 60 days after spray were recorded by random sampling using a quadrat of size 1 x 1 m.

RESULTS AND DISCUSSION

Application at Seedling Stage (45 Days after Germination)

Glyphosate, at all doses tried, was effective in controlling *M. invisa* when applied at seedling stage. It caused yellowing of the plants leading to complete defoliation within four to five days after spraying @ 0.2 to 0.6 kg/ha. Higher rates of glyphosate (0.8 to 1.2 kg/ha) caused quick drying of the growing tips and finally death of whole plant. Thirty days after spray, dry matter production of *M. invisa* regrowth in plots treated with glyphosate at all doses (0.2 to 1.2 kg/ha) applied at seedling stage were significantly lower compared to other herbicides, 0.6 kg/ha and higher dose of glyphosate that could give a significant control for longer periods (Fig. 1).

Application of paraquat (0.2 to 1.2 kg/ha) led

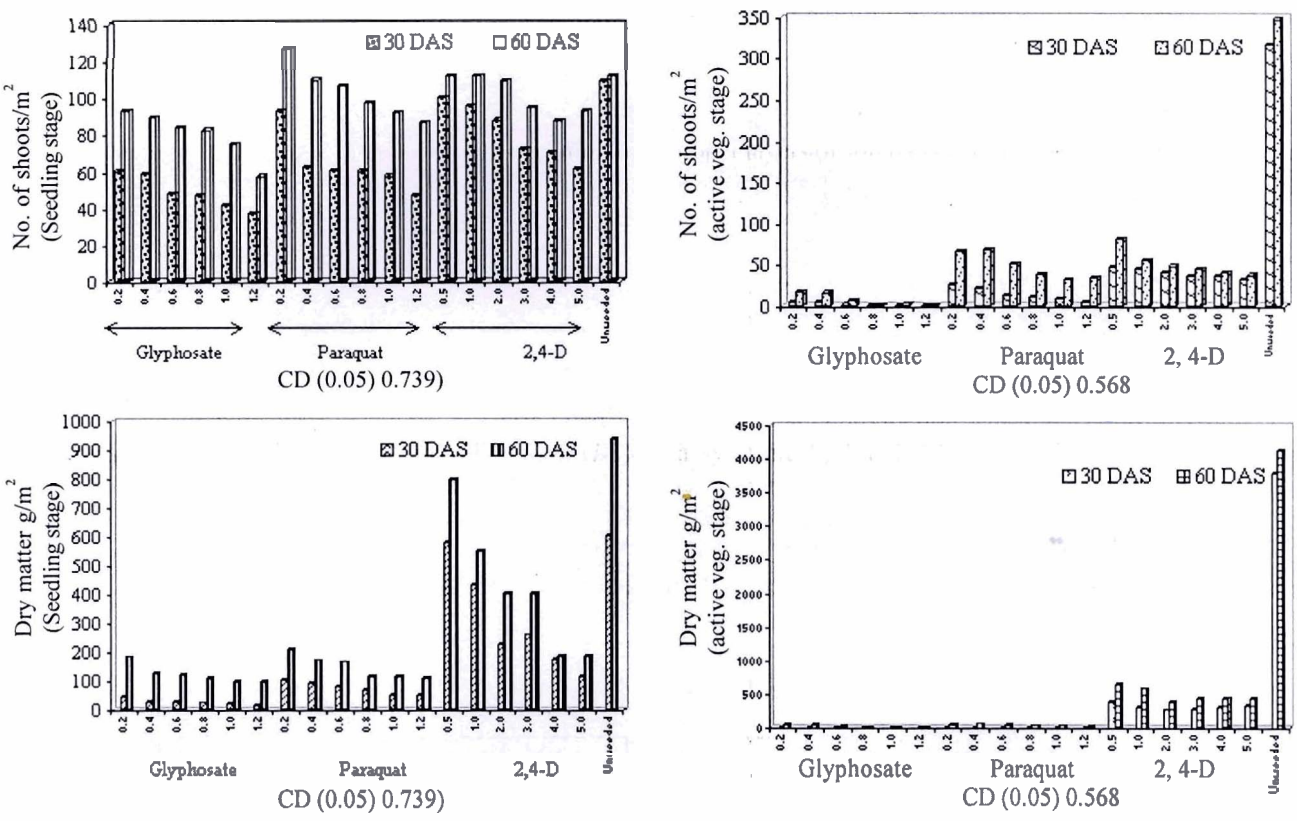
to quick defoliation of the plants at seedling stage. But the fresh shoots produced by the escaped plants and the new flushes germinated from seed bank led to quick re-infestation of the weed. Paraquat was efficient in lowering dry matter production at 0.8 to 1.2 kg/ha and was on par with glyphosate (0.4 kg/ha) at one month after spraying. But these treatments became significantly inferior towards 60 days after spray, due to regrowth and germination of seeedlings which led to rapid re-infestation (Fig. 1).

Application of 2,4-D at seedling stage caused yellowing, bending and twisting of the growing tips exhibiting epinasty symptoms. But the plants were not killed even at very high dose of 5 kg/ha. 2, 4-D applied at seedling stage was not effective in controlling *M. invisa.*

All the herbicides applied at seedling stage were significantly superior to unweeded control.

Application at Active Vegetative Stage (100 Days after Germination)

The application of glyphosate at active vegetative stage was able to lower shoot regrowths and dry matter production at all rates of application compared to their application at seedling stage (Fig. 1). Control of the weed at this stage did not initiate germination of any further flushes, since by that time moisture content of upper layers of soil had become insufficient for favouring germination from soil seed bank. Among the doses of glyphosate tried, application at 0.8, 1.0 and 1.2 kg/ha at active vegetative phase gave significantly better control producing the least dry matter and shoot regrowths even three months after spray (Fig. 1). Among the doses tried, glyphosate @ 0.6 kg/ha and above gave significant control of the plant with regard to both shoot regrowth and dry matter production. The application of glyphosate, a systemic herbicide, at seedling stage (45 days after germination) coincided with monsoon period. At this time even though the application of glyphosate at low dose (0.2 kg/ha) could effectively defoliate *M. invisa*, new flushes emerged from the soil seed bank quickly, utilizing the soil moisture availability. As a result, repeated applications of the herbicide, to destroy all the emerging new flushes or till the seed bank is exhausted, are



DAS : Days after sowing

Fig. 1. Effect of post-emergence herbicides (kg/ha) on the production of new shoots and dry matter in *Mimosa invisa.*

necessary. However, the repeated application of chemicals is not a healthy practice, from the point of ecological and environmental safety. The application of glyphosate at active vegetative stage (100 DAG) @ 0.6 kg/ha effectively killed the *M. invisa* vegetation within a fortnight (Fig. 1). This time of application coincided with the retreat of monsoon, and the germination and establishment of new flushes were also very poor, due to poor availability of soil moisture.

Paraquat, being a contact herbicide, was not effective in controlling *M. invisa*. At lower doses (0.2 to 0.6 kg/ha) applied at seedling stage, regrowth from the unaffected portions occurred within two weeks after defoliation even though at higher doses (1 to 1.2 kg/ha), the regrowth was only delayed. Application of paraquat at active vegetative stage was ineffective (Fig. 1) because the tangled thicket of lush green canopy of *M. invisa* made penetration of chemicals to the lower layers difficult. So, a single application of paraquat left green patches of *M. invisa* vegetation below, unsprayed. These patches which escaped the herbicide, put forth regrowth to cover the area quickly. Hence, repeated application of paraquat was necessary. Paraquat at high concentration (1 to 1.2 kg/ha) could effectively control the weed when sprayed with large volume of water enough to penetrate to the lower canopies. This necessitated employment of more labour for the spray. However, such a heavy dose is not advised due to ecological and environmental considerations.

Application of 2, 4-D was ineffective even at very high dose (4 to 5 kg/ha), both at seedling and active vegetative stages (Fig. 1). This result confirms the earlier reports from this university (Anonymous, 2003). The ineffectiveness of 2, 4-D to control *M. invisa* observed in this study is supported by reports from Brazil (Lew, 1993). 2, 4-D generally used to control broad-leaved weeds might be detoxified in *M. invisa* due to some special mechanism and might have helped the growing tips to recover from the epinasty symptoms and resume growth.

Between the stages of application, all the three herbicides were more efficient at active vegetative stage than at seedling stage. Among the herbicides tested, glyphosate @ 0. 6 kg/ha applied at active vegetative stage (100 days after germination) was most effective and at the same time economically and ecologically safe for managing *M. invisa.*

REFERENCES

Anonymous 2003. *Annual Report- AICRP on Weed Control.* Kerala Agricultural University, Trichur, 63 p.

Lew, A. 1993. Alien plants. *PANTS* **2** : 28-31

Muniyappan , R. and C. A. Virakthamath, 1993. Invasive alien weeds in Western Ghats. *Curr. Sci.* **64** : 555-557.

Nair, N. C. 1964. *Mimosa invisa* Mart.–A new record for India. *J. Bombay Nat. Hist. Soc.* **61** : 469-471.