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RESEARCH NOTE

Evaluation of different weed management practices on weed suppression in young silver oak (*Grevillea robusta*) plantation

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Twenty five dicot and seven monocot weeds belonging to 16 families were recorded in silver oak plantation. Weeds of Asteraceae, Malvaceae (among dicot) and Poaceae (among monocot) families were found in the plantation. Among weed control treatments in silver oak plantaion, black polythene mulch recorded significantly lower dry weed biomass and higher weed control efficiency at different intervals of observations, *i.e.,* two, four and six months after treatment imposition. Almost 99 per cent of reduction in weed biomass and (98.98 %) weed control efficiency observed in black polythene mulch treatment as compared to the control.

Key words: Herbicide, Mulching, Silvar oak

Weed management ideally involves the use of multiple strategies to manage weed populations in a manner that is economically and environmentally sound. Such strategies include cultural, mechanical, chemical and biological methods. In afforestation of plantation, herbaceous weeds are known to compete with newly planted seedlings for water, nutrients, and light. Physical control (synthetic weed barriers and organic mulches), used alone or in combination for the control of weeds in plantation (Cerrillo *et al.,* 2005). Weed controlled forest plantations are commonly characterized by increased plant survival and enhanced growth (South and Miller, 2007). Mulching has been recognized as a beneficial practice in agronomic and forestry systems. This beneficial enhancement has been attributed to the reduction of vegetative competition and to an increase in the availability of key soil resources such as nitrogen and water.

Silver oak (*Grevillea robusta* A. Cunn. ex. R. Br.) is one of the most valuable and widely planted tree species of south India. To ensure better growth and development of silver oak seedlings, control of weeds by effective method is essential. Not much work has been done on management practices like, mulches and use of herbicides on weed control in *G. robusta* plantation and their effect on early seedling growth. The present study investigates the feasibility of suitable weed management practices for effective management of weeds in *G. robusta* plantation.

The experiment was carried out during 2015-16 in farmer's field near Sahasralinga, Sirsi, Uttara Kannada district, Karnataka. The experimental site was situated at 14°59°N latitude and 75 l6°E longitude. For conducting the field experiment, one- year old silver oak *(G. robusta)* plantation was selected. The plantation site and the plant growth were uniform. The spacing provided was 3 x 3 m. The treatments were control (T_1), milky white polythene mulch (T_2), black polythene mulch (T_3), farmer's practice (weeding at 2 months interval (T_4), fertilizer bag mulch (T_5), eupatorium mulch @ 10 t/ha (T_6), mixed dry leaves mulch @ 10 t/ha (T_7), Glyphosate 41 EC @ 1.0 kg a.i./ha, two times (pre-emergent and at 90 days after treatment imposition (T_8), Pendimethalin @ 1.5 kg a.i./ha (pre-emergent) + bispyribac 250 ml/ha (post-emergent) (T_9) and Pendimethalin @ 1.5 kg a.i./ha (pre- emergent) + paraquat 24 EC @ 1.0 kg a.i./ha (post-emergent (T_{10}).

The experiment was laid out in RCBD with three replications. The treatments were imposed during monsoon season during August, 2015 by making plots. Black polythene, white polythene and fertilizer bags were used to cover area in between intra and inter rows of silver oak plantation. Dry leaves of different tree species and eupatorium @ 10 t/ha was applied during treatment imposition. Herbicides were sprayed as per the treatments. The major weed species occurring in the experimental plots were identified and recorded as a major weed flora of the silver oak plantation at two months intervals (dominant species monocot and dicot) after imposition of treatment. For recording the weed population, an area of one m^2 was marked in each treatment and weed observations were taken from the same marked area at two months interval after imposition of treatment. For recording weed biomass (dry weight) in different treatments, the weeds (monocots and dicots separately) in each marked quadrant were pricked out at two months interval and the same samples were oven dried at 80 °C for 12 hours and weighed .The weed dry weight was expressed in terms of kilograms per hectare (kg/ha). The weed control efficiency (WCE) for each treatment was worked (Mani *et al.,* 1973).

Twenty-five dicot and seven monocot weeds belonging to sixteen families were recorded in silver oak plantation. Weeds of Asteraceae, Malvaceae (among dicot) and Poaceae (among monocot) families were found in the plantation. At two months after treatment imposition, significant differences in weed dry weight were observed due to weed management practices in all treatments (Table 1). Significantly minimum dry weight of weeds was recorded in black polythene mulch (0.8 g/m^2), followed by pendimethalin @ 1.5 kg/ha + bispyribac 250 ml/ha (13.3 g/m^2), pendimethalin @ 1.5 kg/ha + paraquat 24 EC (20.8 g/m^2), glyphosate 41 EC @ 1.0 kg a.i./ha two times (22.5 g/m^2), eupatorium 10 t/ha mulch (25.1 g/m^2), fertilizer bag mulch (28.5 g/m^2) and farmer's practice (29.4 g/m^2), and these treatments were on par with each other. Significantly maximum weed dry weight was recorded in control (102.7 g/m^2), followed by milky white polythene (72.6 g/m^2) and these two treatments were on par with each other. At four months after treatment imposition, control recorded significantly higher dry weight of weeds (69.1 g/m), followed by eupatorium mulch (29.3 g/m^2) and milky white polythene mulch (18.3 g/m^2).

Significantly lower weed dry weight was recorded in black polythene mulch (0.9 g/m^2), followed by pendimethalin @ 1.5 kg/ha + paraquat 24 EC (5.1 g/m^2), pendimethalin @ 1.5 kg/ha + bispyribac, 250 ml/ha (5.8 g/m^2), glyphosate 41 EC@ 1.0 kg a.i./ha two times (5.9 g/m^2) and fertilizer bag mulch (8.7 g/m^2). At six months after treatment significantly higher dry weight of weeds was recorded in control (47.1g/m^2) and rest of the treatments recorded weed dry weight on par with each other (Table 1).

Considering weed control efficiency, at two months after treatment was the highest in black polythene mulch (98.93%) followed by pendimethalin @ 1.5 kg/ha + bispyribac 250 ml (85.8 %), glyphosate (80.2%), pendimethalin @ 1.5 kg/ha + paraquat 24 EC (77.07 %). Lowest weed control efficiency (26.65 %) was recorded in milky white polythene, than the control and rest of treatments on par with each other. At four months after treatment imposition the highest weed control efficiency was recorded in black polythene mulch (99.1%) followed by other mulch treatments pendimethalin @ 1.5 kg/ha + paraquat 24 EC (92.27 %), pendimethalin @ 1.5 kg/ha + bispyribac 250(91.03%), glyphosate (89.87 %) and fertilizer bag (86.13 %). Lowest weed control efficiency was recorded by eupatorium mulch (50.33 %), followed by milky white polythene (71.33 %) and mixed dry leaves (76.43 %). At six months after treatment imposition highest weed control efficiency was recorded in black polythene mulch (98.4 %) followed by application of glyphosate (95.5 %) and mulch with mixed dry leaves (94.7 %). The lowest weed control efficiency (81.1 %) was recorded in milky white polythene mulch, followed by eupatorium mulch (83.8 %). Other weed management treatments such as pendimethalin @ 1.5 kg/ha + bispyribac 250 ml/ha, fertilizer bag, pendimethalin @ 1.5 kg/ha + paraquat 24 EC and farmer's practices recorded 93.2, 92.6, 89.4 and 86.7 per cent weed control efficiency respectively (Table 1).

The dry weight of weeds differed significantly among various weed management treatments. In this study lower weed dry weight and higher WCE was recorded in black polythene mulch. This reduced dry matter production of weeds and higher weed control efficiency could be due to lack of sunlight. Mudasir *et al.* (2015) studied influence of different mulcliing materials, *viz.* black polythene, white polythene, paddy straw, saw dust and dry grass on weed suppression and reported that polythene mulch reduced the dry matter production than other treatments. Bhat (2004) studied the effect of herbicide, N, K and orchard floor management practices on growth of weed. Result showed that there was minimum weed population of 11/m^2 recorded under black polythene mulch followed by 22 /m^2 under bi colored polythene mulch, as against un weeded plot control (200/m^2).

Significantly maximum plant height of Silver oak (226.32 cm) recoded in the treatment received black polythene sheet followed by milky white polythene mulch (183.08 cm) and farmer's practice (162.42 cm) where as lowest plant height recorded in control (87.88 cm). Black polythene as a mulch recorded lower weed dry weight, less number of weeds and in turn recorded maximum plant height among different treatments.

Table 1. Effect of weed management techniques on weed biomass and weed control efficiency in young silver oak plantation

Treatments		Weed biomass (g/m^2)			Weed control efficieney (%)			Plant height(cm)
		2 MAT	4 MAT	6 MAT	2 MAT	4 MAT	6 MAT	6 MAT
T_1	Control	102.7^{a}	69.1^{a}	47.1^{a}	0	0	0	87.88^{e}
T_2	Milky white polythene mulch	72.6^{a}	18.3^{bc}	8.1^{b}	26.65^{c}	71.33^{abc}	81.1^{c}	183.08^{b}
T_3	Black polythene mulch	0.8^{c}	0.9^{c}	1.0^{b}	98.93^{a}	99.1^{a}	98.4^{a}	226.32^{a}
T_4	Farmer's practice (Hand weeding at 2 months interval)	29.4^{be}	14.2^{bc}	5.8^{b}	66.83^{b}	73.8^{abc}	86.7^{abc}	162.42^{bc}
T_5	Fertilizer bag mulch	28.5^{bc}	8.7^{c}	3.4^{b}	66.33^{b}	86.13^{ab}	92.6^{abc}	159.43^{c}
T_6	Eupatorium mulch @ 10 t/ha	25.1^{be}	29.3^{b}	7.5^{b}	67.43^{b}	50.33^{c}	83.8^{be}	122.83^{d}
T_7	Mixed dry leaves mulch @ 10 t/ha	34.5^{b}	12.8^{bc}	2.7^{b}	63.03^{b}	76.43^{abc}	94.7^{ab}	137.08^{d}
T_8	Glyp hosate 41 EC @ 1.0 kg a.i./ha, two times (pre-emergent and at 90 days after treatment imposition)	22.5^{be}	5.9^{c}	2.0^{b}	80.2^{ab}	89.87^{ab}	95.5^{ab}	132.45^{d}
T_9	Pendimethalin @ 1.5 kg a.i./ha (pre- emergent) + bispyribac 250 ml/ha (post-emergent)	13.3^{bc}	5.8^{c}	3.2^{b}	85.8^{ab}	91.03^{ab}	93.2^{abc}	146.02^{cd}
T_{10}	Pendimethalin @ 1.5 kg a.i./ha (pre-emergent) + paraquat 24 EC @ 1.0 kg ai./ha (post-emergent)	20.8^{bc}	5.1^{c}	4.4^{b}	77.07^{ab}	92.27^{a}	89.4^{abc}	151.74^{cd}
	S.Em.±	10.93	6.13	2.80	9.71	9.90	4.04	20.87
	C.D. @ 5 %	32.47	18.22	8.33	29.23	29.80	12.28	62.48

MAT-months after treatment

References

Bhat, D. J., 2004, Effect of herbicide, N, K and orchard floor management practices on growth, yield and fruit quality of apricot. *Ph. D. Thesis,* Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan, India.

Cerrillo, R. M. N., Frageiro, B., Ceaceros, C., Campo, A., and Prado, R., 2005, Establishment of *Quercus ilex* L. subsp. *Ballota* Desf. samp. using different weed control strategies in southern Spain. *Ecol. Eng.,* 25: 332-342.

Mudasir, I., Bakshi, P., Wali, V., Jasrotia, A., Kour, K., Ahmed, R. and Bakshi, M., 2015, Sustainable fruit production by soil moisture conservation with different mulches. *African J. Agric.,* 10(2): 4718-4729.

South, D. B. and Miller, J. H., 2007, Growth responses analysis after early control of woody competition for 14 loblolly pine plantations in southern US. *For. Ecol.* and *Mgmt.,* 242: 569-577.