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## EFFECT OF DRIP IRRIGATION AND PLASTIC MULCH ON GROWTH AND SEED YIELD OF FLEMINGIA SEMIALATA

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### ABSTRACT

*Flemingia semialata* is a leguminous busy lac host plant. It is suitable for lac cultivation due to its fast growth. The plant becomes ready for lac cultivation in one year. The seed of *Semialata* is costly and not easily available. Hence, there is a need to make availability of seed of *Semialata* economical and easy. *Semialata* is grown in Jharkhand in rain-fed condition. But if it is grown under drip irrigation in conjunction with plastic mulch then higher seed yield of *semialata* could be achieved. Therefore, in order to achieve aforesaid target, an experiment was conducted on effect of drip irrigation and plastic mulch on growth and seed yield of *Semialata*. Two types of plastic mulch (silver/black and green) were tested at three levels of irrigation (120%, 100% and 80%) with drip irrigation. Green plastic mulch transmits only warming wavelengths of the sun, but not those that allow weeds to grow. This plastic mulch results in warmer soil than black plastic mulch resulting in faster development of plants. However, black plastic mulch is most widely used, available, and inexpensive of the colored mulches, black plastic mulch has excellent weed suppression ability because of its opacity. The use of silver plastic mulch results in lesser insect transmitted disease. The analysis of the data revealed that the green plastic mulch has the highest positive effect on shoot height growth among the two plastic mulches with drip and furrow irrigation at all irrigation levels.

### Introduction

Optimum moisture level in the soil near root zone of the crop is critical to agricultural and plantation crops. Drip irrigation is frequent application of water directly or below the soil surface near root zone of plants (Tiwarly et al., 2014). Mulch, technical term means 'covering of soil' to make more favourable conditions for plant growth (Tswana et al., 2017). Of the mulches, plastic mulches of different colors are most commonly used (Gordon et al., 2010). The beneficial aspects of plastic mulch include conservation of moisture, moderation of soil temperature and control of weeds for better plant growth and higher yield (Ramakrishna et al., 2006). Crop yield and water use efficiency can be considerably increased by excess (Kachwaya et al., 2016), optimal (Tiwarly et al., 1998) or deficit (Ian Mc Cann et al., 2007., Rajbir Singh et al., 2009, Biswas et al., 2015) water supply with drip irrigation in conjunction with plastic mulch (Halil Kirnak et al., 2006, Spehia et al., 2007, Ramalan et al., 2010, Reddy et al., 2017). *Flemingia semialata* is one of the most important leguminous busy species for intensive lac cultivation on plantation basis. *Semialata* is grown in Jharkhand in rain-fed condition but if it is grown under drip irrigation in conjunction with plastic mulch then additional benefits of higher seed yield and water savings may accrue.

### Materials and Methods

Existing *Semialata* plantation was used for experiment. *Semialata* plants are in paired row triangular planting method. The experiment was laid out after harvesting of *Semialata* in the month of February, 2018. The plant to plant spacing of *Semialata* plantation is 1m, row to row is 0.75m and between paired rows is 3m. The plot size of experiment is 5m x 1m and each plot is having 10 plants. The experiment was laid out in randomized block design with 12 treatments replicated thrice making total number of plots to 36. The treatments are as follows:

1. 20% of irrigation requirement met through drip irrigation.
2. 20% of irrigation requirement met through drip irrigation and silver/black plastic mulch.
3. 20% of irrigation requirement met through drip irrigation and green plastic mulch.
4. 00% of irrigation requirement met through drip irrigation.
5. 00% of irrigation requirement met through drip irrigation and silver/black plastic mulch.

6. 00% of irrigation requirement met through drip irrigation and green plastic mulch.
7. 0% of irrigation requirement met through drip irrigation.
8. 0% of irrigation requirement met through drip irrigation and silver/black plastic mulch.
9. 0% of irrigation requirement met through drip irrigation and green plastic mulch.
10. 00% of irrigation requirement met through furrow irrigation.
11. 00% of irrigation requirement met through furrow irrigation and silver/black plastic mulch.
12. 00% of irrigation requirement met through furrow irrigation and green plastic mulch.

For plastic mulch treatments two types of plastic mulch (silver/black of 0.02 mm thickness and green of 0.03 mm thickness) were spread over plots as per treatments. The holes were punched in the plastic mulch where *Semialata* plants were grown. The plastic mulch was anchored in the soil on all sides of plots up to a depth of 6 inches. The drip laterals and drippers were placed under plastic mulch before it was laid. The different levels of irrigation (120%, 100% and 80%) were maintained with the use of varying discharged drippers. Each plant was provided with one dripper. The irrigation was provided to plants with drip irrigation on every alternate day and with furrow irrigation on every fifth day. The water requirement of *Semialata* plants was calculated by the following equation:

$$ET_{\text{crop}} = ET_o \times \text{crop coefficient} \quad 1$$

Where,

$ET_{\text{crop}}$  = Water requirement of *Semialata* per plant per day.

$ET_o$  = Reference evapotranspiration

The  $ET_o$  was calculated by using FAO  $ET_o$  Calculator.

1

The crop coefficient for *Semialata* was selected from Doorenboss and Pruitt research paper no. 24 on Crop Water Requirement in FAO Irrigation and

1

### Results and Discussion

Analysis of data have shown that green plastic mulch has the highest positive effect on shoot height growth among the two plastic mulches with drip and furrow irrigation at all

irrigation levels. Drip irrigation without plastic mulch is performing better in terms of shoot heights as compared to furrow irrigation without plastic mulch at 100% and 80% irrigation levels. However, at 120% irrigation level it is giving equal performance as compared to furrow irrigation (Table. 1).

**Table. 1. Difference in initial and final shoot height (cm)**

FURROW IRRIGATION 100%			DRIP IRRIGATION								
			120%			100%					
			80%								
Furrow irrigation only	Furrow irrigation with silver/black plastic mulch	Furrow irrigation with green plastic mulch	Drip irrigation only			Drip irrigation with silver/black plastic mulch			Drip irrigation with green plastic mulch		
40	35	36	45	41	36	42	36	41	45	42	39

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