EFFECT OF DRIP IRRIGATION AND PLASTICMULCH ON GROWTH AND SEED YIELD OF FLEMINGIA SEMIALATA

Srivastava S.K., Jeet Pawan

ABSTRACT

Flemingia semialata is a leguminous busy lac host plant. It is suitable for lac cultivation dueto its fast growth. The plant becomes ready for lac cultivation in one year.The seed ofSemialata is costly and not easily available. Hence, there is a need to make availability ofseed of Semialata economical and easy. Semialata is grown in Jharkhand in rain-fedCondition. But if it is grown under dripIrrigation in conjunction with plastic mulch thenhigher seed yield of semialata could beachieved. 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) weretested at three levels of irrigation (120%,100% and80%) with drip irrigation. Green plasticmulch transmits only warming wavelengths ofthe sun, but not those that allow weeds togrow. This plastic mulch results in warmer soilthan black plastic mulch resulting in faster development of plants. However, black plasticmulch is most widely used, available, andinexpensive of the colored mulches, blackplastic mulch has excellent weed suppressionability because of its opacity. The use of silverplastic mulch results in lesser insecttransmitted disease. The analysis of the datarevealed that the green plastic mulch has thehighest positive effect on shoot height growthamong the two plastic mulches with drip andfurrow 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 frequentapplication of water directly or below the soilsurface near root zone of plants (Tiwary et al., 2014). Mulch, technical term means 'coveringof soil' to make more favourable conditions forplant growth (Tswanya et al.,2017). Of the mulches, plastic mulches of different colors aremost commonly used (Gordon et al., 2010).The beneficial aspects of plastic mulch includeconservation of moisture, moderation of soiltemperature and control of weeds for betterplant growth and higher yield (Ramakrishnaet al., 2006). Crop yield and water useefficiency can be considerably increased by excess (Kachwaya et al., 2016), optimal (Tiwary 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 conjunctionwith plastic mulch (HalilKirnak et al., 2006,Spehia et al., 2007, Ramalan et al., 2010, Reddyet al.,2017). *Flemingia semialata* is one of mostimportant leguminous busy species forintensive lac cultivation on plantation basis.Semialata is grown in Jharkhand in rain-fedcondition but if it is grown under drip irrigation in conjunction with plastic mulch thenadditional benefits of higher seed yield andwater savings may accrue.

Materials and Methods

Existing Semialata plantation was used for experiment. Semialata plants are in pairedrow triangular planting method. Theexperiment was laid out after harvestingof Semialata in the month of February,2018. The plant to plant spacing of Semialataplantation is 1m, row to row is 0.75m andbetween paired rows is 3m. The plot size ofexperiment is 5mx1m and each plot is having10 plants. The experiment was laid out inrandomized block design with 12 treamentsreplicated thrice making total number of plotsto 36. The treatments are as follows:

1. 20% of irrigation requirement met throughdrip irrigation.
2. 20% of irrigation requirement met throughdrip irrigation and silver/black plastic mulch.
3. 20% of irrigation requirement met throughdrip irrigation and green plastic mulch.
4. 00% of irrigation requirement met throughdrip irrigation.
5. 00% of irrigation requirement met throughdrip irrigation and silver/black plastic mulch.
6. 00% of irrigation requirement met throughdrip irrigation and green plastic mulch.
7. 0% of irrigation requirement met through drip irrigation.
8. 0% of irrigation requirement met throughdrip irrigation and silver/black plastic mulch.
9. 0% of irrigation requirement met throughdrip irrigation and green plastic mulch.
10. 00% of irrigation requirement met throughfurrow irrigation.
11. 00% of irrigation requirement met throughfurrow irrigation and silver/black plastic mulch.
12. 00% of irrigation requirement met throughfurrow irrigation and green plastic mulch.

For plastic mulch treatments two types ofplastic mulch (silver/black of 0.02 mm thicknessand green of 0.03 mm thickness) were spreadover plots as per treatments. The holes werepunched in the plastic mulch where Semialataplants were grown. The plastic mulch was anchored in the soil on all sides of plots up toa depth of 6 inches. The drip laterals and drippers were placed under plastic mulchbefore it was laid. The different levels of irrigation(120%,100% and80%) weremaintained with the use of varying dischargedrippers. Each plant was provided with onedripper. The irrigation was provided to plantswith drip irrigation on every alternate day andwith furrow irrigation on every fifth day. The water requirement of Semialata plants was calculated by the following equation:

ETcrop = ETo x crop coefficient 1

Where,

ETcrop = Water requirement of Semialatalper plant per day.

ETo = Reference evapotranspiration

The ETo was calculated by using FAO ETo Calculator.

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The crop coefficient for Semialata was selectedfrom Doorenboss and Pruitt research paper no. 24 on Crop Water Requirement in FAO Irrigation and Drainage, 1977.

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Results and Discussion

Analysis of data have shown that greeh plasticmulch has the highest positive effect on shootheight growth among the two plastic mulcheswith drip and furrow irrigation at all

irrigationlevels. Drip irrigation without plastic mulch is performing better in terms of shoot heightas compared to furrow irrigation withoutplastic mulch at 100% and 80% irrigation levels. However, at 120% irrigation level it isgiving 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% 80%								100%
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 withgreen plastic mulch		
40	35	36	45	41	36	42	36	41	45	42	39

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