Effect of Poly-Propylene Spun Bonded Crop Covers on Leaf Area Index (LAI) on Growth of Roses

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Abstract— Agro textiles are an important part of technical textiles. Spun bond technology is an emerging area in order to work in Agro-textiles. Also there are various fibers or non-woven fabrics manufactured from this technology. Polypropylene is a material widely used for agro textiles covering vast products from covers, nets and bags. The paper focuses on studying effect of crop cover on LAI on growth of roses. Roses were covered after with different grades of PP cover and then leaf length and height of leaf were calculated. It was seen that Leaf Area Index (LAI) increases as the grade of PP cover increases.

Key words: Agro-textiles, Polypropylene, Crop Covers, Leaf Area Index

I. INTRODUCTION

Agro textiles are beneficial and are known for their excellent properties like good strength, elongation, resistance to sunlight and stiffness. Also they protect from the UV radiations from sunlight. All these properties lead to good harvesting and increase production of crops.

Various types of products like shade nets, covers, bags, mud covers, fishing nets are used in Agro textiles. There are two types of fibers used in Agro textiles. They include Manmade fibers and Natural Fibers. Polypropylene and polyethylene come under manmade fibers while jute and wool come under natural fibers. Crop covers help us to have good harvesting and a considerable increase for production of crops. Crop covers protect against cold, frost, rain and insects. The paper focuses on studying effect of crop cover on LAI and on growth of roses.

II. LITERATURE REVIEW

A. Polypropene

Polypropylene (PP) is the most important and fastest growing polymers currently produced. And it is also a major synthetic material for textile as well as composite industry. A important quality of PP is its capability that it is used in wide fibrous forms. Various applications like automobiles, medical as well as geo textiles are summarized [1]. Creep resistance is improved by making the material light, by changing the process parameters or by adding additives to the material. A model is developed for long-range prediction of creep which shows that a very small deformation is found for high molecular weight of PP with a narrow distribution and with high molecular orientation [2]. Polymer blends enhance the fiber properties by making Biconstituent fibers having combination of Nylon 6 with Nylon 66, PP with PET and block copolyester [3]. A series of sheath/core composite polypropylene fibers with different phase change material (PCM) are studied using SEM, DSC and temperature sensors. The ability of the fabric is affected by PCM, sheath/core ratio and temperature [4]. PP covers were used for early potato crops which increased the productivity and harvest time of crops. This was possible as weight of PP was 2.5 times less than weight of perforated polyethylene film. Harvest period increased by 2-3 weeks [5].

B. Agro Textiles

Agro textiles provide good quality of horticulture and agriculture products which have a good production rate. This is made possible by use of nets and covers [6]. Fly ash is used as a limiting material for incorporating the improvement of pH values of alkali soils [7]. Similarly tropospheric O_3 has a negative on productivity of crops but it can be lowered by crop breeding [8]. Today use of Technical Textiles having different new materials is increasing and new technologies are developed [9]. It is observed from Figure 2 that technical textiles cover almost 80 % of the market than bulk textiles.

III. EXPERIMENTAL METHODOLOGY

A. Material

Crop covers were made up of different grades (20, 40, and 60) of poly-propylene which was manufactured using Spun Bond Technology. Total of 15 roses were used for each grade of cover.

B. Experimental Methodology

Fig.1 shows the flow of experimental methodology used for the current work. The readings for leaf length and height of leaf were taken at intervals of 2 days for all the grades of crop cover. Fig.2 and Fig.3 shows the leaf length and height of leaf for roses.

Fig. 1: Experimental Methodology

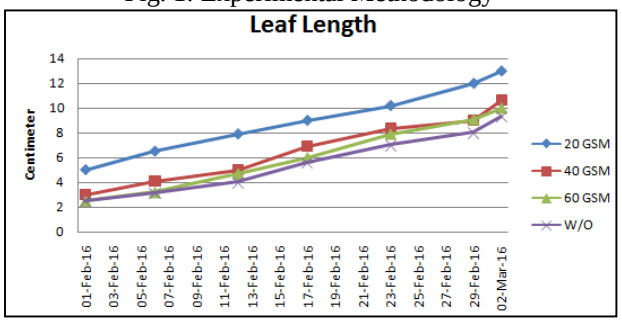

Fig. 2: Leaf Length

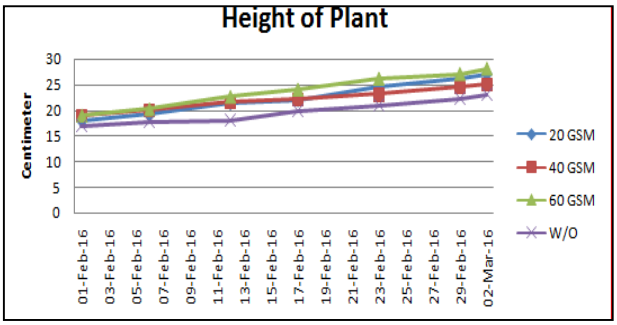

Fig. 3: Height of Leaf

IV. Results and Discussions

Results are tabulated in Table 1. Leaf Area Index (LAI) is calculated as given in equation below. Table 2 shows the time intervals for which the readings were collected.

Specifications	Fabrics			
	20	40	60	W/O Cover
Weight of plant (gm)-W1	10 (avg.)	11(avg.)	10(avg.)	9 (avg.)
Length of Leaf (cm)	5(avg.)	3(avg.)	2.5(avg.)	2.5 (avg.)
LAI (cm)	28.57	40	50	16.7
Height of Plant (cm)	18(avg.)	19(avg.)	19(avg.)	17 (avg.)

Table 1: Data For Roses

Time Intervals (Date)	**Fabrics**			
	20	**40**	**60**	**W/O Cover**
Seed Plantation	01-02-2016	01-02-2016	01-02-2016	01-02-2016
Plantation	17-02-2016	17-02-2016	17-02-2016	17-02-2016

Table 2: Time Intervals For Roses

Leaf Area Index (LAI) is calculated using the formula given below.

Sample Calculations for 1st Experiment. Original Leaf Length = 7 cm Calculated Leaf Length = 5 cm

$$LAI = \frac{(7-5)}{7} \times 100 = 28.57\ cm$$

Fig. 4 shows the LAI for different grades of PP crop cover.

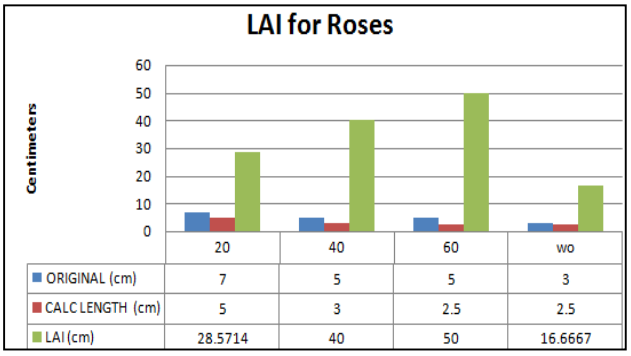

Fig. 4: LAI for roses

V. Conclusions

Agro textiles are beneficial and are known for their excellent properties like good strength, elongation, resistance to sunlight and stiffness. Also they protect from the UV radiations from sunlight. All these properties lead to good harvesting and increase production of roses. It was observed that leaf length and height of leaf affect LAI of roses. LAI of roses increase with the increase in grade of crop cover and gives good production of roses.

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