the surface irrigation schedule. Khade *et al.*, (1989) also reported that the mean seed yielf of green gram increased by 15.82 per cent and 33 per cent less water was used with the sprinkler method compared to check basin method.

An economic analysis was made on the average grain yield basis and furnished in Table 2.

The cost of cultivation in the sprinkler irrigation for the additional area irrigated was also deducted from the value of the product to arrive the net profit.

The irrigated crop area ratio was 1:2 between the surface and sprinkler irrigation.

$$\text{The irrigated crop area ratio} = \frac{\text{Area irrigated by sprinkler system by unit quantity water}}{\text{Area irrigated by surface irrigation by unit quantity of water.}}$$

The profit obtained in surface irrigation method was on an average Rs. 2445/- per ha whereas by using the same quantity of water, the profit obtained from 2 ha under sprinkler irrigation method was Rs. 4294/-. The profit ratio between surface and aprinkler irrigation system was 1:1.76.

$$\text{Profit ratio} = \frac{\text{Profit obtained from sprinkler irrigation by using unit quantity of water}}{\text{Profit obtained from surface irrigation by using unit quantity of water}}$$

This indicated whenever water is a constraint resource and land is available in excess with farmer, the sprinkler system can increase the profit by 76 per cent over surface irrigation. Hence, the irrigation schedule of 2.5 cm depth of spray at 0.5 IW/CPE ratio which was giving better yields and WUE was found to be optimum.

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INFLUENCE OF BIO-REGULATORS ON BIOMASS PRODUCTION IN MULBERRY *(Morus alba)*

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ABSTRACT

Foliar application of bioregulators. *viz* 2-3-4- dichlorophenoxy triethylamine, (DCPTA) (Photosynthogen), mixtalol (Paras) and triacontanol (Vipul) on the fresh leaf biomass production in mulbery (Var.Kanva -2) was assessed. The study revealed that photosynthogen at 25 g.ai./ha. significantly increased the leaf number, leaf area and fresh leaf biomass than paras or vipul. The increased leaf biomass in mulberry due to photosynthogen spray was by high source activity as evidenced by high chlorophyll and high soluble protein content.

KEY WORDS : Mulberry, Photosynthogen, leaf biomass

Bioregulators have been shown to increase the growth and biomass in a wide variety of crop plants. Increased plant height and internodal length by triacontanol were reported in tomato and pea (Henry and Kelm, 1980 Gunasekaran and Shanmugavelu, 1983). Tertiary amine bio regulator DCPTA has been shown to promote growth and biomass through regulations of chloroplast development and chlorophyll compartment (Keithly and Yokoyama 1987, 1988). Increased leaf and root meristem activities of DCPTA could potentially increases photosynthate production and

biomass (Kiethly and Yokoyama, 1987) In the present study, the influence of three bio regulators, on fresh leaf biomass production in mulberry (var. Kanva.2) was assessed.

MATERIALS AND METHODS

Mulbery var.Kanva.2.planted during 1989 was pruned and regular agronomical operations including application of organic and inorganic fertilisation at the rate of 10 t of FYM and 300, 120, 120 kg/ha of NPK were applied. The experiment was laid out in a simple randomised blocks design in three replications and the following chemicals were sprayed on 40th and 70th day after pruning, 2-(3-4-chlorophenoxy) triethylamine) (Photosyntho gen) at 6.25, 12.5, 18.75 and 25 g. ai/ha), mixtalol (Paras) at 12.5 ppm, and triacontanol (Vipul) at 5 ppm along with control as water spray. Fifteen days after the second spray fresh leaf biomass per plant, leaf area, number of branches, number of leaves, total chlorphyll content (Yoshida *et al*, 1971) and soluble protein content (Lowry *et al*, 1951) were determined and the results were statistically scrutinised and presented.

RESULTS AND DISCUSSION

The data (Table 1) on the fresh leaf biomass, leaf area, leaf number, total chlorophyll content and soluble protein contents showed significant differences due to treatments. Among the treatments, maximum leaf biomass (342.2 g/pl), was found in DCPTA at 25 g ai/ha followed by 18.75 g ai/ha while, in control the fresh leaf biomass production was only 246.5 g/pl. It was observed that with an increase in the dose of DCPTA from 6.25 g ai/ha to 25g ai/ha there was an increase of 14.6 percent in leaf biomass production. Mixtalol at 12.5 ppm recorded a similar increase in leaf biomass on par with DCPTA at 18.75 g ai/ha there was no significant biomass difference with triacontanol as compared to control treatment.

As regards to the number of leaves and leaf area per plant, significant differences were observed due to treatments as compared to control, DCPTA spray considerably increased the leaf number (195.7) and leaf area (18,838 cm^2. pl^{-1}) while in control the leaf number and leaf area were minimum, 129, and 14,232 cm^2, pl^{-1} respectively. Increase in leaf number and leaf area increase was maximum in DCPTA treatment (at 25 g ai/ha) followed by mixtalol and DCPTA at 18.75 g ai/ha. The treatment difference with regard to number of branches however remained non significant.

The total chlorophyll and soluble protein content of the leaves, showed an increase due to DCPTA spray. Maximum chlorophyll content (1.945 mg, g^{-1}) and soluble protein (47.344 mg. g^{-1}) were recorded at DCPTA at 25 g ai/ha than control. With an increase in DCPTA concentration, a significant increase in chlorophyll content was observed. The increased chlorophyll and soluble protein content with higher biomass after spray with DCPTA indicates efficient photosynthetic apparatus with stable protein synthetic machinery in treated plants. In mixtalol and triacontanol treatments, though the chlorophyll content was lower than control, the soluble protein content remained higher than control. Significant increase in chlorophyll and soluble protein due to DCPTA spray indicates that it might be playing a role in synthesis of chlorophyll and the enzymes

Table 1. Growth performance of mulberry plants due to chemical manipulation

Treatments	Leaf area per plant (cm^2)	Fresh leaf biomass per plant (g)	No. of branches per plant	No. of leaves per plant	Total chlorophyll ($mg.g^{-1}$)	Soluble protein ($mg.g^{-1}$)
DCPTA 6.25 g ai/ha	16445	284.8	11.67	185.2	1.503	32.692
DCPTA 12.5 g "	16686	291.7	10.33	185.7	1.684	39.778
DCPTA 18.75 "	17539	303.8	10.58	186.0	1.931	41.287
DCPTA 25 "	18838	342.2	11.17	195.7	1.945	47.344
Mixtalol12.5 ppm "	17209	298.0	11.42	192.7	1.203	30.456
Triacontanol 5 ppm "	14794	256.2	10.25	159.3	1.350	39.581
Control	14232	246.5	9.92	129.0	1.474	29.342
C.D. at 5%	2709	34.8	NS	45.6	0.136	3.651

NS : Not significant

associated with chlorophyll synthesis. Increased leaf biomass due to treatments as recorded in the present study is well supported by increased photosynthetic efficiency (soluble proteins) as reported in green gram (Chandra Babu *et al.*, 1988). Co- ordinated increase in vegetative plant growth indicates that balanced partitioning of photosynthates between plant growth and foliage yield through regulation of chloroplast development (Gausman *et al*, 1985). Regulation of vegetative growth by DCPTA appears to involve the regulation of chlorophyll biogenesis and increased soluble protein as evidenced in spinach and sugarbeet (Keithly and Yokoyama, 1988). It is inferred that the use of growth regulators like DCPTA has a substantial role in maintaining assimilatory surface area with increased chlorophyll coupled with high functional ability.

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ROPE DISPENSER FORM OF GOSSYPLURE AND INSECTICIDES ON PREDATORS IN COTTON ECOSYSTEM

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ABSTRACT

Studies with PBW-Rope dispenser form of gossyplure @ 78g a.i/ha in cotton ecosystem revealed that population of *Menochilus* sp. and spiders (Thomicidae) was more in PBW-Rope dispenser treated plots when used alone. When alternated with either fenvalerate or monocrotophos on the basis of ETL recorded more of *Menochilus* sp. than spiders. However, application of monocrotophos after the PBW-Rope dispenser was less toxic to both coccinellids and spiders. Fenvalerate spray once in 15 days reduced the coccinellids and spiders and when sprayed on the basis of ETL, was more toxic to spiders than to coccinellids.

KEY WORDS : Gossyplure, Rope Dispenser, Insecticide, Cotton

Synthetic sex pheromones can be used in integrated pest management programmes. Gossyplure (1:1 mixture of 7.11-hexa decadienyl acetate) a synthetic sex pheromone against *Pectinophora gossypiella* (Saund.) at low concentration was effective (Balasubramanian *et al.*, 1978; Flint *et al.*, 1979; Hubner *et al.*, 1981; Flint and Markle, 1984). The efficacy of hollow fibres, laminated flakes and microencapsulated form of gossyplure was as effective as insecticides for pink bollworm control (Critchley *et al.*, 1985). A new polyethylene tube dispenser containing gossyplure at higher quantity (68-78 mg) (PBW-Rope dispenser) was effective (Flint *et al.*, 1985). Besides the direct effects, indirect effects of gossyplure on parasitoids and predators were also reported (Critchley *et al.*, 1985; Chen *et al.*, 1986) However, studies are meagre with PBW- Rope dispenser form of gossyplure. The indirect effects of PBW-Rope dispenser on predator complex in cotton ecosystem were studied in comparison with fenvalerate.