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Innovative Eco Friendly Techniques to Control the Weed Menace in Sericulture

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Abstract: Sericulture is an agro-based industry with food plants and silkworms being its 2 major components. As per one estimate the expenditure made on production of leaves come to be about 60% of cocoon production cost. Whether it is mulberry or non-mulberry sector, weeds have been a major reason for loss of nutrients of the soil otherwise meant for the growth of food plants and thereby lowering leaf production and in turn reducing cocoon production potential. This is why that in sericulture control of weeds is a regular exercise of maintenance of food plants and this control is brought out mainly through manual weeding by investing a good deal of man power and thus the expenditure. This study brings forth 2 innovative techniques for weed control. These techniques are not only the nonpolluting and eco-friendly but at the same time it puts the energies taken away by the weed from sericulture fields, back into system for bettering the utilization of available soil nutrient and for improving the production of foliage qualitatively and quantitatively thus bringing down the expenditure of foliage production.

Key words: Weeds, weed control, mulching, chemical control, biological control, manual weeding

INTRODUCTION

Sericulture is an agro-based industry with food plants and silkworms being its 2 major components. As per one estimate the expenditure made on production of leaves come to be about 60% of cocoon production cost. Whether it is mulberry or non-mulberry sector, weeds have been a major reason for loss of nutrients of the soil otherwise meant for the growth of food plants and thereby lowering leaf production. This is the reason that the weeding has been a regular exercise in sericulture to put the weed growth in check. Weeding in sericulture is mainly done manually with good amount of expenditure made on it by way of labor wages payment. This practice only partially control the problem as soil nutrients, which have already been utilized by weeds, goes out of system with weeds.

An efficient control of weeds will go a long way to bring down the expenses and contain the soil nutrients there itself and thereby increasing qualitative and quantitative cocoon production and the profit margin.

What the weeds are up to: Broadly speaking any unwanted plant growing amongst our desired raised plantation is weed for us. Weeds have been a challenge to the mankind since the time immemorial, of course since the time man learnt to cultivate plants for his own use. In fact a weed is a nature's bliss meant to keep earth surface under green cover, due to its inherent power of very fast propagation, but in the process they have become stiff competitors agricultural crops and other cultivated plants. The crop loss due to weeds may range from 30-50% and as per one belief of some scientists; this loss may be directly proportional to amount of weed growth. The weed growth in the forest areas is greatly enhanced by cutting and clearing and most of the weeds, whose growth is encouraged by heavier felling, grows taller and luxuriant and are harmful to regeneration of many other plants.

Weed control: The histories of weed control is as ancient as the history of terming/ understanding some plants as weeds and since time immemorial efforts are on to find more and more effective ways of weed control.

The existing available methods of weed control have some advantage and limitations too e.g.

Manual weeding: This is the most ancient and of course the most common method. It is easiest and simplest but is labor intensive. It may cause root damage; panning of the soil and is very slow and inefficient (Seth, 1977).

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Chemical control: It is easy effective and fast, but is polluting and may lead to development of herbicides resistant weeds (Seth, 1977; Nada, 1976). Further no single herbicide provides lasting control to all the weed species (Seth, 1977).

Intercropping through legumes: This method prevents soil erosion and further weed growth (Seth, 1977), however it is not practicable and needs advance planning.

Biological control: It is based on the principal that any organism that curtails plant growth or reproduction may be used as a biological weed control agent (Hoffaker, 1964). Successful outcome of biological weed control requires:

- The establishment of presence of natural enemy.
- The build up of natural enemy population.
- Control of target weeds (Andres, 1977).

However, it is highly specific and very expensive e.g., cost of investigation of a weed feeding insect for biological control has been estimated as high as ½ to 1 million dollars (Harris, 1971).

In sericulture, both in mulberry and non mulberry, control of weeds is a regular exercise of maintenance of food plants and this control is brought out mainly through manual weeding by investing a good deal of man days and thus the expenditure.

This study brings forth two innovative techniques for weed control. These techniques are not only the nonpolluting and eco-friendly but at the same time it puts back the energies taken away by the weeds from sericulture fields, back into system for bettering the utilization of available soil nutrient and for improving the production of foliage qualitatively and quantitatively thus bringing down the expenditure of foliage production thereby reducing the cocoon production cost.

MATERIALS AND METHODS

The study was carried out at CRC Hehal farm of Regional Sericultural Research Station Ranchi, Jharkhand India in the existing plantation of *Morus alba.*

The two methods of weed control, conceived and employed were;

- Weed control by weed itself.
- Weed control through use of urea

Weed control by weed itself: Twenty plots of existing plantation of *Morus alba* of 3 M×3 M size were earmarked for the study. After cessation of monsoon, in half of these plots (i.e., 10 plots), weeds were uprooted and mulched there itself as the surface mulch, ensuring 10-14 cm thick cushion and was treated as treatment. In the rest 10 plots weeds were uprooted manually and thrown out of the field and this set was treated as control. Weed count per sq ft was recorded 5, 15, 30, 45, 60, 75, 90, 105 and 125 days after treatment and Efficacy Percent (EP) of two methods was recorded.

Weed control through use of urea: Twenty plots of 3 M×3M size of existing plantation of *Morus alba* were taken for the study. Aqueous solution of urea of varying concentration i.e., 10, 15, 30 and 40% were sprayed on the weeds growing these plots with control sets being sprayed with water. Each treatment was replicated four times. Observation were recorded on weed count 900 sq cm, on 5, 15, 30, 45, 60, 75, 90, 105 and 125th days of spray. The EPs of different concentrations of Urea were worked out.

RESULTS AND DISCUSSION

Weed control by weed itself: Data on weed population count on different period after treatment are presented in Table 1 and Fig. 1. This can be seen that weed mulching effectively controlled the weed growth as the weed population as measured by no. of weeds/900 sq cm were invariably low in weed mulched sets compared to sets in which manual weeding was carried out, on all counts Even after 125th day average weed population was 52.2 % lower in weed mulched sets. The average wed count was 72. 3% lower in the weed mulched sets.

This can be seen from figure that efficacy of weed control through this method increased up to 30th days and thereafter declined, however, this decline has been very gradual and EP has been around 80% for more than two months and thereafter too the decline has not been very steep and even after 125th days, EP has been more than 50%.

Weed control through use of urea: Data on the efficacy of weed control through urea solution are presented in Fig. 2 and 3. As evident from figures, urea solution has been very effective in containing the weed growth, however, the efficacy of weed control through urea improved with increasing concentration. Lowest concentration i.e. 10% urea solution checked the weed population initially only and later on this rather enhanced the growth of weeds and enhanced both i.e. the average

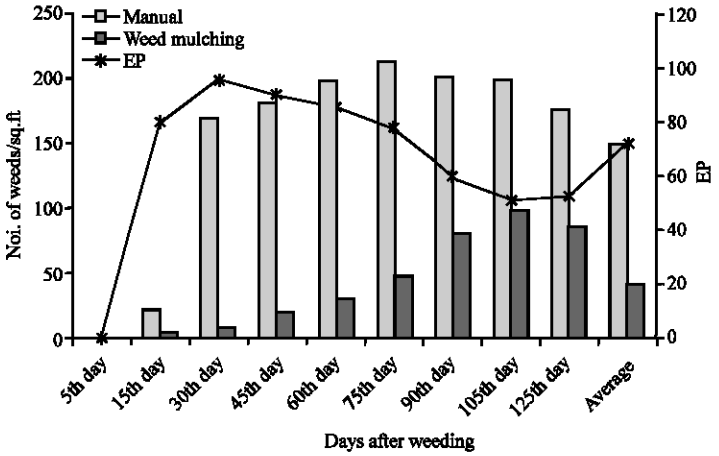

Fig. 1: Efficacy of weed mulching in weed control

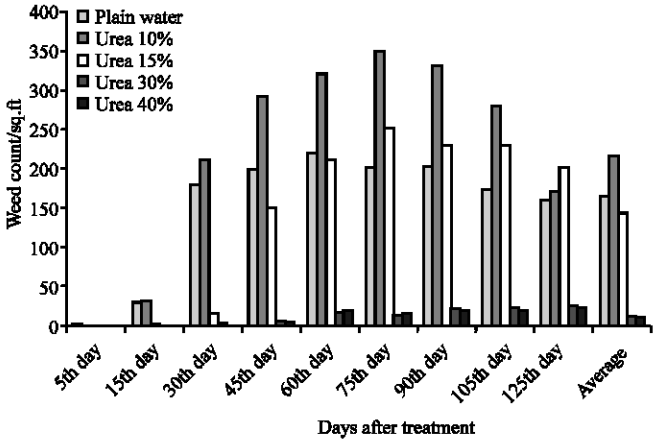

Fig. 2: Weed count at different intervals after spray of different concentrations of urea solution

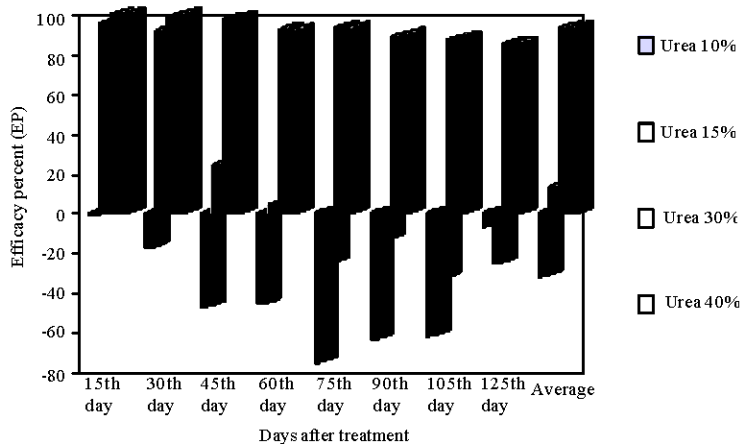

Fig. 3: Efficacy Percent (EP) of various concentrations of urea in controlling weeds at different intervals

Table 1: Economics of different methods of weed control

		Material cost USD			Application cost			
S.No.	Type of weed control	Materials	Rate (USD)	Material cost (USD)	Mandays (nos)	Rate (USD)	Material cost (USD)	Total cost
1	Weed mulching	-	-	-	8	2.0	16.0	16.0
2	Urea spray	Urea 90 kg	0.125	11.25	2	2.0	4.0	15.25
3	Manual	-	-	-	200	2.0	40.0	40.0
4	Weedicides	2.25 lit	9.5/lit	21.4	2	2.0	4.0	25.38

weed count as well as weed count at 125th day. At 15% also, though the average weed count was lesser up to 60th days but after 60th days weed count was invariably higher compared to control. At 30 and 40% urea concentration weed growth was effectively checked and weed population was very low all through, thus keeping the average weed count as well as weed count at 125th day far below than their control counterparts Data also clearly show that 10 and 15% urea solution could contain the weed growth in initial phase i.e. 100 EP was achieved at 5th day, thereafter at 15 day, while EP came down to 95. 6% with 15% urea, the 10% urea solution showed rather negative EP. On subsequent counts, EPs with 10% and 15% urea solutions has shown declining trend. However 30 and 40 % urea solution could contain weed population for about four months with EP higher than 80%. This can also be seen that EP value with 30 and 40% urea solutions have been more or less at par so 30% may be preferred.

Table 1 depicts the economics of different methods of weed control. This is clear from the table that manual weeding is most expensive followed by weed control through weedicides, weed mulching and urea spray however weed mulching and urea spray methods are more or less at par cost wise. While weed control through weedicides adds pollutants to the soil, the weed control through weed mulching and urea spray have added advantage of adding fertility to the soil and are eco-friendly. The foregoing clearly suggest that the two proposed can well be used in fighting against weed menace and will add to economy and eco-friendliness' to sericulture.

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