EFFECT OF DIFFERENT TRAP CROPS AGAINST ROOT KNOT NEMATODE DISEASE OF JUTE

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ABSTRACT

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An experiment was conducted at JAES, Manikganj and Monirampur, Jessore of Bangladesh Jute Research Institute during 2005-2007 to study the effectiveness of growing of sunhemp, sesbania, safflower and marigold as a trap crop. Seeds of *olitorius* variety O-9897 and Sesbania (*Sesbania rostata*), Safflower (*Carthamus tinctorius*), Sunhemp (*Crotalaria juncea*), Marigold (*Tagetes patula*) were sown in line as trap crop in nematode infested soil. Finding revealed that the highest gall formation was found in control and the lowest gall formation when sunhemp used. Plant height, fibre and stick yield found higher under the treatment with sunhemp + jute. Among four treatments sunhemp showed suitable trap crop for reducing gall formation.

Keyword: Trap crop, gall, fibre and stick weight, root knot nematode

INTRODUCTION

Jute (*Corchorus capsularis* L. and *Corchorus olitorius* L.) is the most important cash crop and one of the major foreign currency earners of Bangladesh. Jute fibre is extensively used all over the world for its versatility, durability and fineness. It is used for the production of newsprint paper, carpet, hessians, gunny bags, ropes, juton etc. Now a days, jute sticks are used in making partex.

Jute is mostly grown in the Indo-Bangladesh region and in some countries of Southeast Asia. It has been reported that about 90% of world's jute is produced in Bangladesh and India (Atwal 1976). In respect to the production, Bangladesh ranks second among the jute growing countries of the world. In Bangladesh, about 4.72 lac hectares of land are under jute cultivation and the total yield is 821000 m.ton (BBS, 2006). It is worthy to note that 100 thousand traders and 250 thousand industrial labours earn their livelihood from the jute business (Khandaker 1987). Jute ranks second only to cotton among all the natural fibre in case of production (Talukder *et al.* 1989).

Root-knot of jute caused by *Meloidogyne* spp. is one of the most important diseases of jute in Bangladesh and affected at various stages of growth (Talukder, 1974 and Ahmed, 1977). Hot and humid climate of Bangladesh makes it a suitable bed for the predominantly occurring *Meloidogyne javanica* and *Meloidogyne incognita* along with other 14 genera of plant parasitic nematodes (Timm and Ameen, 1960). Chattopadhary and Sengupta (1955) reported that stunting, wilting, defoliation and death to the attack of root knot nematode, *Meloidogyne javanica* (Kofoid and White) Chitwood. Ahmed and Timm (1961) found that *M. incognita* and *M javanica* were responsible for root knot disease of jute. Plant parasitic nematodes are obligate parasite. They can not survive in absence of their host. Trap crop enhance root knot nematode eggs to hatch. The larvae enter the roots but fail to develop. Sunhemp is a common green manuring crop in Bangladesh. It is susceptible to invasion by the root knot nematodes but resistant to the development of their larvae thus reduced the nematode population in soil (Quader, 1995). Nematodes are tiny, worm like, multicellular animals adapted to living in water. The number of nematode species is estimated at half a million, many of which are "free living" types found in the oceans, in freshwater habitats and in soils. Plant parasitic species form a smaller group. Nematodes are common in soils all over the world (Dropkin, 1980; Yepsen, 1984).

No specific control measure of root knot has been yet suggested in Bangladesh to save jute crop from the disease, safely. Besides, this chemical control is very expensive for controlling root knot disease. Moreover, their harmful effect is responsible for air, soil and water pollution (Alam, 1987). Various botanicals have recently been reported to have nematicidal properties (Mahmood *et al.,* 1982, Sartaj *et al.,* 1985, Ahmed *et al.,* 1990).

MATERIALS AND METHODS

The experiment was conducted at JAES, Manikganj and Monirampur, Jessore of Bangladesh Jute Research Institute during 2006-2007 crop seasons.

Seeds of olitorius variety O-9897 and Sesbania (*Sesbania rostata*I, Safflower (*Carthamus tinctorius*), Sunhemp (*Crotalaria juncea*), Marigold (*Tagetes patula*) were sown in line as trap crop in nematode infested soil at JAES and Monirampur. Land was prepared by deep ploughing and applied recommendation fertilizer doses (Urea- 200 kg/ha, TSP- 50 kg/ha, MP- 60 kg/ha, Gypsum- 95 kg/ha and Zinc Sulphate- 11 kg/ha). Urea was applied two times half amount of urea applied on sowing time and half 45 days after sowing. TSP, MP, Gypsum and Zinc Sulphate were applied on sowing time. Each line was 3 meters long and with 3 replications. Stand data was recorded after 40 days of sowing. Ten plants from each line were uprooted carefully and washed with water without disturbing the roots at the age of 90 days of the plants. The roots of each accession were examined for gall formation.

RESULTS AND DISCUSSION

Gall index

Sesbania, safflower, marigold and sunhemp cultivated to soil and gave considerable reduction in gall number in roots of jute. The ranges decrease gall numbers over control were 44.29, 70, 60 and 91.43% under the treatments with sesbania + jute, safflower + jute, marigold + jute, sunhemp + jute, respectively (Table 1).

Highest gall number of gall formation was found in control, safflower, marigold showed near similar results and reduction of gall formation highly reduced with sunhemp (Figure 1). Ahmed *et al.* (1988) reported that galling incidence was higher both non treated and less fertilized plants. Certain Prairie species have been found to provide excellent nematode control when used trap crop (Anon. 1996, Ploe, 2000).

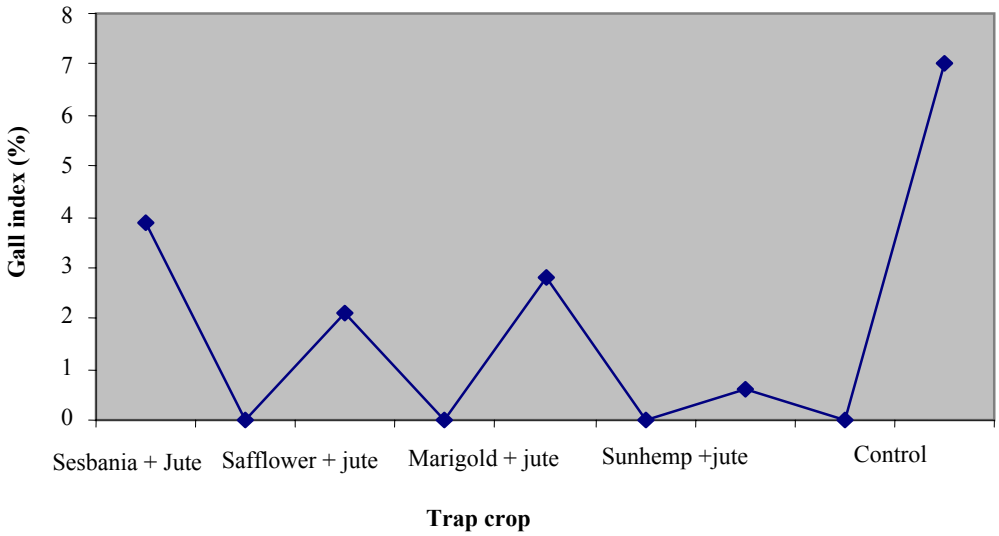

Figure 1. Effect of different trap crops on jute root gall formation

Table 1. Effect of different trap crop on jute root gall formation

Treatment	% Decrease gall formation of gall number over control
Control	-
Sesbania + Jute	44.29
Safflower + Jute	70
Marigold + Jute	60
Sunhemp + Jute	91.43

Plant height

Increase of plant height over control was achieved with all treatment applied to soil infested with *Meloidogyne* spp. However appreciable improvement of plant height was recorded under the treatments with sunhemp + jute and safflower + jute (Figure 2).

Depending on the treatment the ranges of increase in plant height over control were 3.81, 9.29, 2.38 and 14.76 % under the treatments with sesbania + jute, safflower + jute, marigold + jute, sunhemp + jute, respectively (Table 2).

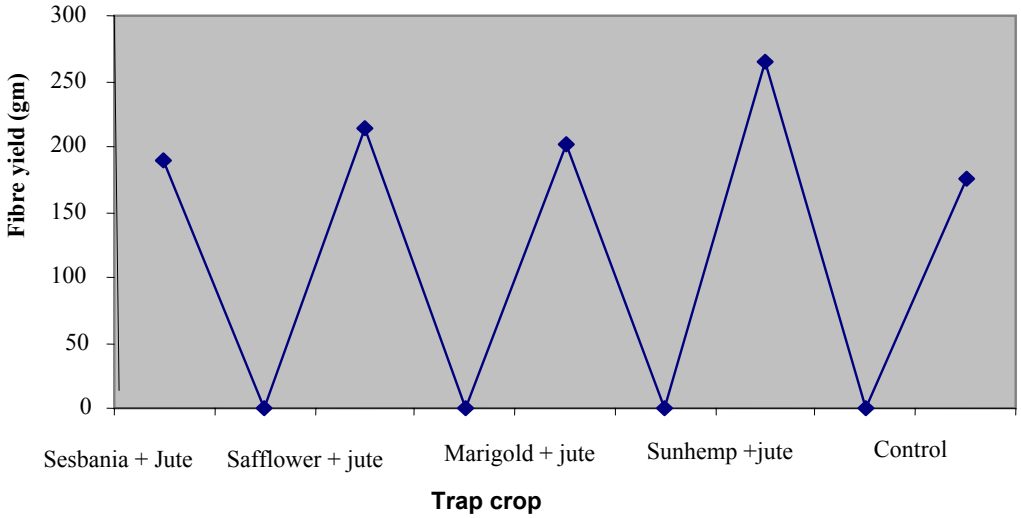

Figure 2. Effect of different trap crops on jute fibre yield

Table 2. Effect of different trap crop on jute plant height

Treatment	% increase jute plant height over control
Control	-
Sesbania + Jute	3.81
Safflower + Jute	9.29
Marigold + Jute	2.38
Sunhemp + Jute	14.76

Fibre and stick yield

Appreciable fibre and stick yield was recorded due to cultivation of sunhemp with jute. Identically same fibre and stick yield found with sesbania + jute, safflower + jute and marigold + jute and lowest yield found in control treatment.

Fibre and stick yield found higher with sunhemp + jute and it was 265 and 576 gm, respectively (Figure 3 & 4).

The fibre and stick yield increased over control were 8.57, 22.29, 15.43 and 51.43% and 19.1, 19.53, 18.12 and 35.53% under the treatments with sesbania + jute, safflower + jute, marigold + jute, sunhemp + jute, respectively (Table 3 & 4).

This finding agreed with Phukan and Roy, 1983. They reported that yield loss of jute fibre weight be up to 50% due to attack of root knot nematode.

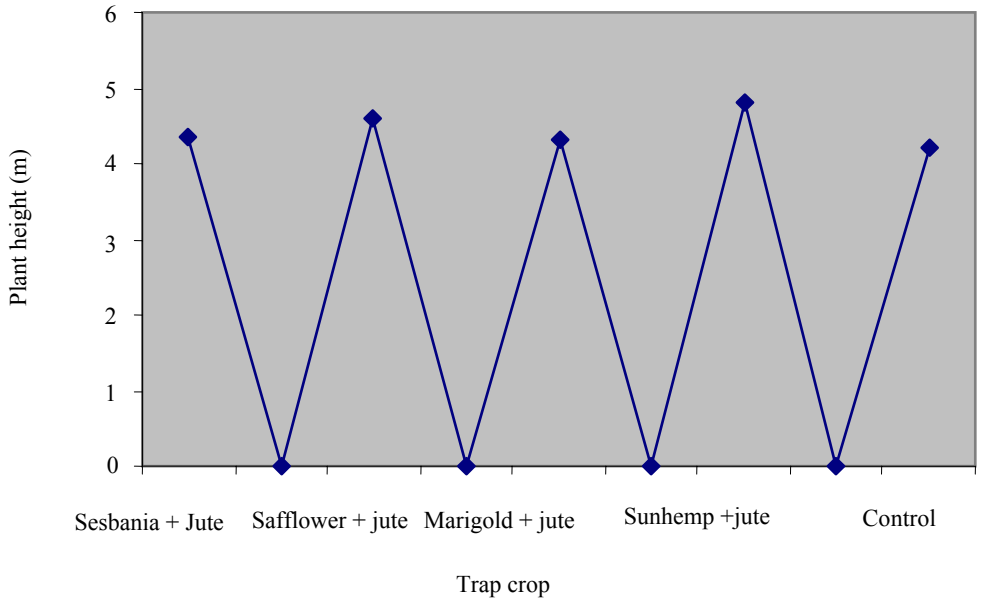

Figure 3. Effect of different trap crops on jute plant height

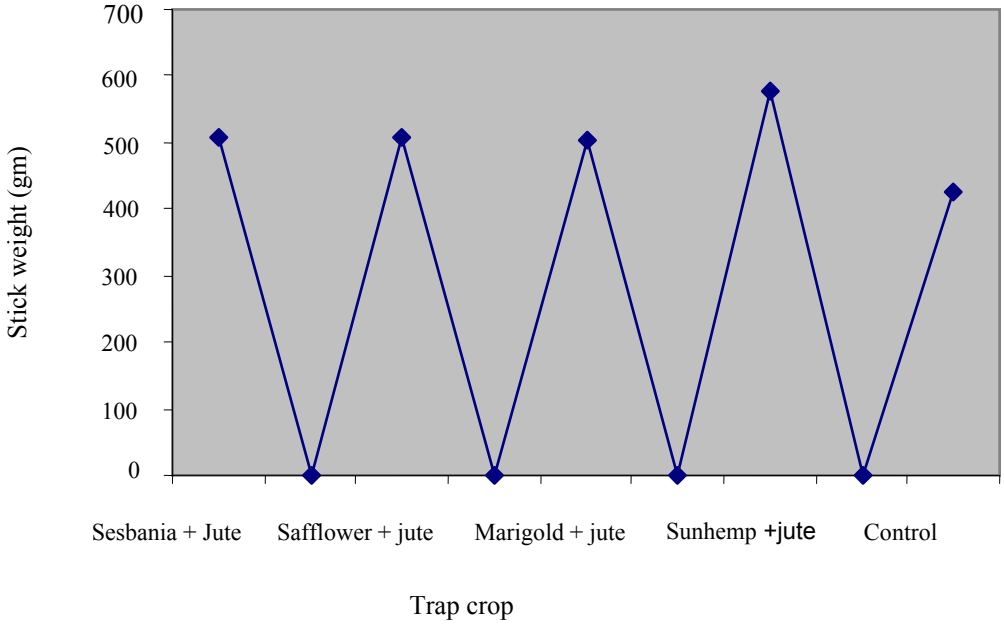

Figure 4. Effect of different trap crops on jute stick yield

Table 3. Effect of different trap crop on jute fibre weight

Treatment	% increase jute fibre weight over control
Control	-
Sesbania + Jute	8.57
Safflower + Jute	22.29
Marigold + Jute	15.43
Sunhemp + Jute	51.43

Table 4. Effect of different trap crop on jute stick weight

Treatment	% increase jute stick weight over control
Control	-
Sesbania + Jute	19.06
Safflower + Jute	19.53
Marigold + Jute	18.12
Sunhemp + Jute	35.53

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