Effects of Peanut Intercropped and Trash Mulch on Weed Control and Growth of Sugarcane

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ABSTRACT

Investigation on the effect of peanut intercropped and trash mulch on weed control and growth of sugarcane were conducted during 1982-1987 at farmer's fields in Suphan Buri and Nakhon-Pathom province. The results revealed that intercropping of peanut in plant cane could reduce weed infestation by 31.1%. In ratoon cane, mulching with sugarcane leaves provided better yield than unmulching by 48.4% in average. Trash mulch seemed to be beneficial for reducing weed dry weight and enhancing growth of sugarcane at the early stage of ratooning.

INTRODUCTION

Owing to the wide plant cane row spacing 1.30-1.50 m, it is preferable for weed growth. Particularly in the early stage of cane plants, weeds can grow rapidly and compete the space with the crop. In order to reduce the competitive effect of weeds to the crop, some cash crops such as maize, mungbean and soybean are grown in the interrows. Many substantial researchs supported an advantage of intercropping in sugarcane i.e. maximum utilization of land, to smother or shade out of weeds and reduced the need for weeding (Moody, 1978 and Cambell, 1974). There was no reduction in yield when mungbean, soybean and corn were intercropped with sugarcane (Srivines et al, 1976). Paner (1975) reported that sugarcane intercropped with soybean, peanut and mungbean gave net return of 1.34, 2.48 and 2.84 US$ invested. Kajonpon et al (1979) demonstrated that the intercropping during the early growth of plant cane or the ratoons provided earlier monetary returns. However, disadvantage of intercropping may occured when the growing condition was not preferable. For example, in Taiwan, Chang et al (1968) reported that reduction of cane tillers were 21, 26 and 46% when intercropped with peanut, sweet potato and soybean, respectively. Cane tillers reduction 35% was shown in another report when intercropped with mungbean (Singh and Gupta, 1960).

Planted cane is usually followed by one to three ratoon cycles. Weed control practices in ratoons, depend on the method of harvesting which was adapted in each planting region, i.e. most of grower in the Central West prefer to use sugarcane leaves for mulching which does not only prevent from loss of soil fertility, but it also provides lower soil temperature, increase moisture availability and suppress regrowth of perennial weeds.

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Chotikanta et al (1979) showed 70.3% significant increase of yield when ratooned cane (variety F-140) was mulched with cane leaves, compared with unmulched cane. In contrast, in the Eastern region they still prefer to burn cane leaves by which weed seeds near soil surface will be killed and reproductive portions of some perennials are also inhibited. However, non-trash-burning retained more soil moisture and as a result the yield of ratoon cane was higher than that in trash burning by average of 28.8 tons/ha. Many substantial researchs supported the benefit of trash mulch between cane rows of ratoons. Agrawal (1990) reported that 15 cm trash mulch between cane rows after one hoeing during November in Uttar Pradesh, suppressed weeds and conserve soil moisture. Mann (1989) demonstrated his studies at Palampur, India that trash mulching at 7.5 tons/ha increased cane yield as well as sugar content.

The objectives of these studies are to prove the possible benefit of intercropping and trash mulch in the cane fields on weeds and growth of sugarcane.

MATERIALS AND METHODS

1. Effect of peanut intercropped

The experiment for evaluation the effect of peanut intercropped was conducted in farmer's field in Suphan Buri province during May,1986 to April 1987.

1.1 Test plot

The trial site was ploughed and laid out in split plot design with 4 replications. Plot size was 6.0x10.0 m. The two main plot were sugar cane (variety F-140) monoculture and intercropped with peanut (at planting space of 0.30x0.50 m). The sub plot were weed control treatments consisting of unweeded, weed competition for 1 month, weed competition for 2 months, and alachlor application at the rate of 3.0 kg ai/ha.

1.2 Planting method

Two cane setts with 2-3 buds each were planted in a spacing of 0.5 x 1.5 m. Fertilizer (15-15-15) at 312.5 kg/ha was applied in the furrow before placing the cane setts. Then, 2-3 seeds of peanut per hole were seeded at 2-3 cm deep in two rows between the cane rows. Other general practices and insecticide application for control other pests were made as necessary. The herbicide treatment was applied immediately after seeding. Manual weeding was operated in treatments different duration of weed competition.

1.3 Measurement

Observation of weed control efficacy by random check of weed dry weight was conducted at 4 months after planting. Fresh weight of peanut pods at the harvesting time (4 months after seeding) were assessed. Measuring the length and number of cane stalks was conducted in the same day as checking weed weight. After the peanuts were harvested, their plant residues were ploughed into the soil. Final cane yields were determined at 10 months after planting.

2. Effects of sugarcane leaves for mulching

The effects of sugarcane leaves for mulching was studied in the first ratoon cane (variety F-140), in farmer's field, in Kamphaeng Saen district, Nakhon Pathom province, during March, 1982 to February, 1983.

2.1 Test plot

The experiment was arranged into randomized complete block with 4 treatments and

6 replications. All treatments were showed in Table 3. Plot size was 6.5 x 10.0 m.

2.2 Planting method

After the plant cane harvested, the plot site was shaved clean and sufficient moisture for inducing germination of weed seeds was supplied by furrow irrigation. Atrazine+ametryn at 2.5 + 2.5 kg ai/ha was applied as a post-emergence in the designed treatments at 1 month after irrigation. Trash mulch was treated in 10.0 cm thick at 2 days after irrigation.

2.3 Measurement

Efficiency of weed control was assessed in term of weeds dry weight at the second and the fourth month. Thereafter, the off-barring for fertilization, then hilling up in all treatment were operated. Length and number of cane stalks and final cane yield were evaluated at 10 months after ratooning.

RESULTS AND DISCUSSION

1. Effect of peanut intercropped

As shown in Table 1, the length and number of cane stalks grown as monoculture were less than those intercropped with peanuts in all treatments of weed control, but they were not statistically different. Weed competition for 1 month gave the length and number of cane stalk more than the treatments of weed competition for 2 months and chemical control. Even in unweeded situation, cane plants intercropped with peanut grew better than those in monoculture. Weed dry weight in all treatments of cane intercropped with peanut were significantly less

Table 1. Length and number of cane stalks and cane yields when growing in monoculture and intercropped with peanut.

Treatment	Weed dry weight (gm/m^2)	Cane stalk		
		Length[1] (cm)	Number[1] (stalks/ha) x 1,000	Yield[2] (tons/ha)
Sugarcane monoculture				
Unweeded	1,641.5	83.2	28.9	19.2
Weed competition for 1 month	508.2	129.8	50.1	52.4
Weed competition for 2 months	611.4	96.4	46.6	48.1
Alachlor 3.0 kg ai/ha	849.3	118.5	48.2	41.6
Sugarcane intercropped with peanut				
Unweeded	1,130.4	98.9	31.4	21.4
Weed competition for 1 month	159.4	138.4	54.2	55.8
Weed competition for 2 months	203.7	132.7	48.4	51.6
Alachlor 3.0 kg ai/ha	283.0	122.6	49.5	49.2
LSD 0.05				
Effect of intercropping	328.6	NS	NS	NS
Effect of weed control	39.8	17.8	2.9	5.5
Interaction	52.6	NS	NS	NS

1) Assessed at 4 months after planting

2) Harvested at 10 months after planting

Table 2. Yield of peanut when intercropped with sugarcane

Treatment	Pod fresh weight of peanut (kg/ha)
Unweeded	1,568.8 b[1)]
Weed competition for 1 month	2,818.1 a
Weed competition for 2 months	2,568.8 a
Alachlor 3.0 kg ai/ha	2,318.2 ab

1) Means within a column followed by the same letter are not significantly different at the 5% level

than in the corespondent treatment in monoculture.

These results may indicate that, intercropping could significantly reduce weed populations in the cane fields, which resulted to increasing cane yield as well. Although the yield of intercropped sugarcane was no significantly increased, yield of peanut in each treatment was significantly different in relation to duration of weed competition (Table 2).

Peanut intercropped at early stage of cane growth was influenced by different level of weed infestation. In this trial, for peanut, weed should be controlled within 1 month after seeding. Weed competition extended to the second month caused reduction in yields of cane and peanut. This result agrees with York and Cobble (1977). Preemergence herbicide, alachlor at the rate of 3.0 kg ai/ha provided moderate control which was expressed in term of weeds dry weight by 48.2 and 75.0% less than unweeded plot in monoculture and intercropped plot, respectively.

In comparing the unweeded treatments of monoculture and intercropping of this experiment, intercropping of peanut in sugarcane could reduce average, weed infestation at least 31.1% and number of cane stalks and yield production increased 8.7 and 11.5%, respectively. This result was coincided to the study of Moenandir (1985) which revealed that sugarcane when intercropped with peanut gave higher yield than grown alone. Therefore, using cropping sequences could reduce weed interference in the main crops (De Datta and Jeriza, 1976). These kinds of control techniques in which new crops or systems are introduced have wide implications for field management and economical weed control.

2. Effects of sugarcane leaves for mulching

The results in Table 3 revealed that the treatment of unmulching + no herbicide provided the highest weed dry weight of 1,683.1 and 2,876.9 gm/m^2, assessed at the second and the fourth month of ratooning, respectively. They were highly significantly different from the trash mulched plot. Mulching with sugarcane leaves gave better cane yield (expressed in term of lenght and number of cane stalks), than unmulching and final yields were 40.4 and 46.3 tons/ha while those of unmulched treatments were 21.6 and 31.2 tons/ha, respectively.

In unmulched plots, herbicides appeared significantly different performance for reducing weed dry weight and increasing yield by 9.6 tons/ha whereas the plot of trash mulched and followed with post emergent herbicides application gave 5.9 tons/ha, higher yield than mulched + untreated

Table 3. Effects of trash mulch on weeds and growth of sugarcane in the first ratoon.

Treatments		Weeds dry weight (gm/m^2)		Cane stalk[3]		
Mulch	Herbicide[1]	2 MAR[2]	4 MAR[2]	Length (cm)	Number (stalks/ha) x 1,000	Yield (tons/ha)
-	-	1,683.1 a	2,876.9 a	146.4 d	30.4 c	21.6 c
-	x	412.4 b	987.3 b	223.6 c	42.7 b	31.2 b
x	-	167.8 bc	288.6 c	241.5 b	45.6 ab	40.4 a
x	x	41.5 c	67.3 d	250.2 a	55.1 a	46.3 a
LSD 0.05		333.0	332.6	7.5	10.3	9.4

1) Herbicides were atrazine + ametryn at 2.5 + 2.5 kg ai/ha
2) MAR = Months after ratooning
3) Harvested at 10 months after ratooning

herbicides but it was not statistically difference. Therefore, mulching with cane leaves would be beneficial particularly at the early stage of ratooning from germination of cane stubs to tillering during which the cane required sufficient soil moisture. Furthermore, cane leaves may suppress weed emergence (Akobundu, 1980 and Sing, 1981) and prevent from the infestation with some major weed species such as *Cyperus rotundus, Dactyloctenium aegyptium, Echinochloa colona, Eleusine indica and Euphorbia geniculata.*

As generally practices, ratooning of cane plants in the testing area is operated during dry season in each year. Trash is mulched along the interrow in order to minimize water loss, reduce the risk of erosion and discourage further weed growth. In such case, the cane fields are left for 2-3 months until the first rain comes, then interrow cultivation is mechanically carried out. By this means, weed problems could become less serious than when the trash is burned out.

CONCLUSIONS

Intercropping of peanut in the interrow reduced average weed infestation of 31.1% and increased plant cane yield of 11.5% compared with monoculture. Weed control for better yields of both crops should be operated within the first month by manual weeding or spraying with selective preemergence herbicides.

Sugarcane leaves were used for mulching between rows of ratoon cane. Trash mulch gave good effect on weed control, and increased average cane yield 48.4% . These beneficial effects of trash mulch are attributed not only to preserve soil moisture but also reduce competitive ability of weeds at early stage of ratooning.

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