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Introducing Glyricidea Into Goat - Food Crops Mixed Farming in The Upland Areas

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ABSTRACT: Glyricidea, legume trees (*Glyricidea maculata)*, were introduced into food crop-goat mixed farming practiced by 20 farmers of Boyolali and Grobogan upland areas. In Trial 1, farmers were planting a combination of corn and peanut fertilized by either 1) glyricidea, cut and carried from land terraces (Treatment I), 2) goat manure (Treatment II), and 3) urea and tri superphosphate (Treatment III). Partial budgeting showed that the use of glyricidea as a fertilizer gave added values due to higher production of food crops and lower costs of fertilizer (Treatment I *vs* Treatment II and III). In Trial 2, raising does with supplementation of glyricidea to the ration failed to increase does' performance. However, it affected the daily gain of the kids ($P<.05$). The goats were still kept by farmers and monitored to evaluate if raising goat with glyricidea-food crops farming could alleviate poverty.

Key Words: Glyricidea, Mixed-Farming, Upland Areas

Introduction

Gondanglegi and Dimoro, two villages located on Java island, Indonesia, were taken as village samples of watershed areas where farmers practiced food crop farming on the upland areas, as well as adopting some techniques of land conservation and rehabilitation. Aside from many kinds of tree introduced by The Department of Forestry in the land conservation and rehabilitation projects, some fodder plants including grasses and legumes have also been introduced. Glyricidea (*Glyricidea maculata*) was one of the farmers' choice for reducing land erosion when planted on the land terraces, as well as for feed supply. Livestock raising integrated into mixed farming was proved to have a significant role in increasing farm income (Sastrodihardjo, 1980; Wiguna, 1979), especially in the upland areas. Increasing the livestock numbers in order to increse the income, therefore, was supposed to stimulate the farmers to increase feed supply by growing fodder plants, including glyricidea, and at the same time could reduce land erosion, if they were grown on the land terraces. Forage harvested from glyricidea could be used for protein supply in goat feeding, as well as for green fertilizer. Previous trial (UGM-P3HTA, 1990) showed that organic fertilizer in the forms of glyricidea forage and cattle manure, applied at 4.6 ton/ha could replace 80 kg/ha of tri superphosphate (TSP) and 40 kg/ha of urea.

The objectives of this study were 1) to evaluate the benefit of using glyricidea leaves as green fertilizer and goat manure as fertilizer for mixed crop production corn and peanut (Trial 1) and 2) to evaluate the use of glyricidea leaves as protein supplementation to traditionally does feeding (Trial 2).

Materials and Methods

Trial 1

Sixty plots of 15x30 sqm used for multiple cropping of corn and peanut practiced by 20 farmers were randomly assigned to 3 treatments of fertilizer using: 1) glyricidea leaves at 4.6 ton dry matter per ha (Treatment I), 2) cattle manure at 4.6 ton dry matter per ha (Treatment II) or 3) urea and TSP at 400 and 800 kg per ha (Treatment III). Glyricidea leaves were harvested from those planted on the contour lines of land terraces, alternately with King grass. The organic fertilizers were applied at 2 weeks before and 1 week after planting, at the proportion of 2/3 and 1/3, respectively, while the inorganic fertilizers were applied 15 and 30 days after planting equally. The data which were collected but not reported in this paper were plant growths

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and days of flowering. Productions of stover, straw and grains were recorded to be used in partial budgeting analysis (Kay, 1981; Amir and Knipscheer, 1989). A partial budget, also known as a partial profit budget, is the tabulation of expected gains and losses due to relatively minor change in farming method; in this case they were treatment I *vs* II, and treatment I *vs* III.

Trial 2

Forty of Kacang-grade does at the age from 1 to 1.5 years and 53 of their offsprings were used in a feeding trial. All does were distributed equally to 20 farmers in Gondanglegi and Dimoro villages and subjected to 2 treatments: 1) traditionally feeding with low quality shrub and grass supplemented with 0,42 kg dry matter of glyricidea leaves and 2) such traditionally feeding with no supplementation. All goats were confined in 2x2.5 sqm of stilted housings. Data collected were feed consumption and average daily gains (ADG) of both the does and the kids, and statistically analyzed using t-test for two-group comparison menthod (Snedecor and Cochran, 1976).

Results and Discussion

Trial 1: The use of glyricidea as fertilizer

Table 1 shows the partial budget for the use of glyricidea to replace urea and TSP as fertilizer for multiple crops of corn and peanut (treatment I *vs* II). It is shown that the substraction A - B was positive. It means that the use of glyricidea as fertilizer resulted in higher value compared to the use of urea and TSP. This higher value came from a small amount of an additional value of peanut production. No additional income coming from corn production, as reported in the previous report (UGM-P3HTA, 1990), that there was no significant difference of corn grain production. The significant figure reported herein was the high reduced cost (Rp 340,000/ha in one period of corn production) due to not purchasing urea and TSP. On the other hand, the costs expended for land cultivation, seed and planting labor were very low. These costs were calculated as average costs per period over 5 years.

Similar to Table 1, Table 2 shows partial budget for the use of glyricidea to replace manure as fertilizer (Treatment I *vs* III). There was also observed a higher value of the use of glyricidea compared to that of cattle manure.

Aside from those shown on Table 1 and 2, there was other additional values coming from fodder plant, *i. e.* 1) glyricidea leaves, at the time food crops did not require them as fertilizer and 2) King grass production. Previous report (UGM-P3HTA, 1990) showed that the land which was used for multiple cropping with this type of management could supply feed for 16 goats/ha. It means that an average of .25 ha of land owned by a farmer, could supply feed enough for 4 additional goats, without cutting leaves from those trees used for land conservation.

Trial 2: Glyricidea as protein supplement for goats

Average daily feed consumptions of does were shown in Table 3. There was no significant difference between average dry matter consumption of does receiving glyricidea as protein supplement and the controls. Average dry matter consumptions were considered very low (246.3 and 231.6 g/head), which were only 1% of body weight (initial and final body weights are shown in Table 4). Quality of basal feeds, as commonly fed to the goats in these areas, was very low, due to either the low class they belong to or the age of shrubs and grasses. These include low quality grasses (unidentified) in a large amount, *mahoni*, jackfruit and acacia leaves.

The ADG of does during 200-day observation were shown in Table 4. There was no significant difference in the ADG due to glyricidea supplementation. It could be explained, that 1) dry matter consumptions were subnormal, 2) there was no more growth because of the age and 3) the does had to supply milk for the kids.

It was more interesting to observe the growth of the kids (Table 5), which was supposed to have economic important. The ADG of kids belonged to does receiving glyricidea was higher ($P<.05$) than those controls. It was economically important, because the price of goat was determined by its weight, although weighing was not practiced by farmers and buyers in goat markets.

From trial 1 and 2, it could be concluded as follows.

1) The use of glyricidea leaves as fertilizer in multiple cropping was economically beneficial over the use of urea and TSP and the use of cattle manure, at Rp 326,000 and Rp 122,000 per ha per period.

2) Introduction of glyricidea together with King grass along the contour lines of land terraces was another additional value in terms of additional feed supply for goats at the rate of 16 goats per ha.

3) When the does were traditionally fed with low quality feed, supplementation with glyricidea leaves did not improve both feed consumption and average daily gain of the does.

4) However, supplementation with glyricidea in does feeding indirectly improved the growth of the kids.

Table 1. Partial budget for the use of Glyricidea to replace Urea and Tri Superphosphate (TSP) as Fertilizer for multiple crops (Rp/ha)

Gains (A)		Losses (B)	
Added returns		Added costs	
Corn grains	0	Cultivating, seed,	
Corn stover	0	planting	20,000
Peanut	6,000		
Peanut straw	0		
Subtotal	6,000	Subtotal	20,000
Reduced costs		Reduced returns	
Urea	100,000		
TSP	240,000		
Subtotal	340,000	Subtotal	0
Total A	346,000	Total B	20,000
A - B = 346,000 - 20,000 = 326,000			

Table 2. Partial budget for the use of Glyricidea to replace Manure as Fertilizer for multiple crops (Rp/ha)

Gains (A)		Losses (B)	
Added returns		Added costs	
Corn grains	0	Cultivating, seed,	
Corn stover	0	planting	20,000
Peanut	4,000		
Peanut straw	0		
Subtotal	4,000	Subtotal	20,000
Reduced costs		Reduced returns	
Manure	138,000		
Subtotal	138,000	Subtotal	0
Total A	142,000	Total B	20,000
A - B = 142,000 - 20,000 = 122,000			

Table 3. Average daily feed consumption of project's DOE in Gondanglegi, Boyolali and Dimoro, Grobogan

Feed component	With glyricidea	Without glyricidea
	---------- g dry matter/head ----------	
Glyricidea	29.5	----
Traditional forage	216.8±118.4	231.6±117.1
Total[a]	246.3±118.4	231.6±117.1

[a]No significant difference.

Table 4. Average daily gain (ADG) of project's DOE in Gondanglegi, Boyolali and Dimoro, Grobogan for 200 days (kg)

Weighing	With glyricidea	Without glyricidea
Initial[a]	25.60±3.87	25.65±3.79
Final[a]	26.45±3.93	27.55±3.64
ADG[a]	.04± .01	.02± .01

[a]No significant difference.

Table 5. Average daily gain of project's kid during 14-week observation affected by different DOE feedings

Village	Doe feeding	
	With glyricidea	Without glyricidea
	----------g/d ----------	
Gondanglegi	50.28±19.82	47.38±20.10
Dimoro	70.01±15.98	62.26±21.00
Both villages	61.97±20.13[a]	55.40±21.89[b]

[a,b]Different (P<.05)

Literature Cited

Amir, P. and H. C. Knipscheer. 1989. Conducting On-farm Animal Research: Procedures & Economic Analysis. Winrock Internat'l Inst. for Agric. Development and Internat'l Development Research Center, Canada.

Kay, R. D. 1981. Farm Management. Planning, Control and Implementation. McGraw-Hill Internat'l Book Co., Tokyo, Japan.

Sastrodihardjo, S. 1980. Pengembangan Budidaya Ternak di Wilayah Transmigrasi. J. Penelitian dan Pengembangan Pertanian, Indonesia

Snedecor, G. W. and W. G. Cochran. 1976. Statistical Methods. The Iowa State Univ. Press, Ames, Iowa, USA.

UGM-P3HTA. 1990. Peranan Rumput, Legum dan Limbah Pertanian untuk Konservasi Tanah dan Sumber Pakan di Daerah Aliran Sungai Jratunseluna. Kerjasama Fakultas Peternakan UGM dengan Litbang. Pertanian, Rep. Indonesia.

Wiguna, M. A. 1979. Pengaruh Peternakan dalam Usahatani Terpadu di Kabupaten Kulon Progo. Proceedings Seminar Penelitian, LPP, Ciawi, Indonesia.