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Study on the Population of Grass Weeds and Broad Leaves Weeds Under Napier Hybrid Establishment with Application of Different Combination of Organic Manures

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Abstract:- This study is carried out to efficient usage of available nutrients to emerge good quality fodders with minimum disturbance of weed population with different mixtures of organic manures. Hybrid Napier (CO3) is a high yielding perennial fodder grass, commonly cultivated in Sri Lanka as a popular fodder grass. This grass was propagated through cuttings at spacing of 60 x 60cm with the treatment of four kind of organic combinations (poultry manure, cattle manure and goat manure: 3:5:2, 2:2:1, 5:3:2 and 3:1:1) and a free of any organic supply (control). Proper management practices such as irrigation was practiced according to the recommended amount and interval. Number of weeds were counted and categorized into grass weeds and broad leaves weeds weekly wise after planting the cuttings. The results revealed that the weeds population show significant differences ($p > 0.05$) with the different combinations of organic fertilizer applications. Broad leave weeds showed dominant establishment than grass weeds and they were greater competitor for fodder to achieve the sufficient nutrients of the soil. Though, they performed best in the combinations of 3:5:2, 2:2:1 and 3:1:1. However, optimum weed population with best performance of CO3 were maintained in the combination of 5:3:2. Therefore, perfect organic fertilizer combination may be helpful to make the field to achieve highest quantity of yield with optimum level of weed population and to acquire good quality forage. This study may support to convert the farm as cost effective and high income generating agribusiness.

Keywords:- *Napier hybrid, grass weeds, broad leave weeds, population of weeds, combinations of organic amendments.*

I. INTRODUCTION

Resembling the other South and Southeast Asian countries in Sri Lanka, low productivity of dairy animals could be accredited to the less availability of forage together with poor quality. To maximize the milk production, it is essential to feed animals with quality green fodder [1]. Therefore, high yielding forages including number of varieties of Napier hybrids have been introduced recently. Hybrid Napier variety CO3 was developed by the scientists at Tamil Nadu Agricultural University (TNAU) at Coimbatoor and released for commercial cultivation in 1997 [2]. CO3 is one of the highest yielding perennial tropical fodder grasses and considered as cut-and-carry forage for stall feeder systems. It is superior to other Napier varieties. The characteristic features of CO3 fodder grass are profuse tillering, high yield potential, high dry matter and crude protein content, quick regeneration capacity, high leaf to stem ratio, high palatability, free from pest and diseases and low in adverse factors [1].

There are a number of factors which can influence the successful establishment of pastures and fodders. The factors we can control are cultivar selection, type of planting material, sowing or planting rate, time of planting both from year to year and within one season, method of sowing or planting, weed management, use of appropriate fertilizers and time of first grazing or cutting [3].

Regular pattern of fertilizer application should always be followed by the farmers for this high yielding grass. Thairu and Tessema (1985) reported that managing high yielding forages without fertilizer is extremely impossible even in normal soil and rainfall conditions [4]. Since this grass is a heavy yielder, it requires high doses of nutrients. On the other hand, nutrient management has pronounced effect on yield and quality of the fodder grass. Further, balanced nutrient supply also ensures utilization of all nutrients. As this grass is a heavy user of soil inputs, some farmers are unwilling to handle of this type of high yielding fodder grasses. Although this grass responds very quickly for inorganic fertilizer, livestock manure that could be supplied with in the farmer premises is an important resource for grass cultivation [1].

Weed control is one of the important parameter to obtain good quality feed for animal. A weed is a plant considered undesirable in a particular situation a plant in the wrong place [5]. According to the morphological features, weeds can be classified into broad leaves and narrow leaves (grass weeds). Broad leaf weeds have two seed leaves as they emerge through the soil. Their leaves are generally wider than those of grass weeds (but not always). Veins on the leaves are branched or net-like. Their stems are oval, round or square and are often branched. They may have showy flowers. But grass weeds have only one seed leaf. Their leaf blades are narrow and have parallel veins. Stems are round or oval. They may develop seed

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heads at the ends of the stems, but if they have flowers they will be inconspicuous. Group of broad leaf weeds has such named; clover, dandelion, purslane, and grassy type weeds; nuts edge, pampas grass and Bermuda grass.

There are over 30,000 species of weeds around the world [6]. Out of these about 18,000 are known to cause serious losses. Weeds can replace desirable grass species, filling in gaps or voids and reducing yield and overall quality of fodder. Weeds can produce allelopathic substances that are toxic to crop plants. In addition, weeds such as poison hemlock *(*Conium maculatum*), white snakeroot (*Eupatorium rugosum*), and black locust (*Robinia pseudoacacia*) ha*ve toxic properties that can cause livestock injury or loss under certain circumstances. Weeds are often harvested along with forage crops, potentially reducing quality. Reductions in quality often take the form of lower protein content, feed digestibility or even reduced intake by the animals. Many weeds contain poisonous substances that may be toxic to livestock if consumed. In addition, certain weeds may be problematic because of mechanical irritation when eaten, photosensitization and disagreeable tastes or odors in meat, milk, or milk products [7].

Moreover, heavy weeds infestation may cause complete crop failure. The cost of removing weeds adds to the cost of production of crops, thus producers losses part of their investment and the country suffers a reduction in agricultural products. They harm our agricultural crops in other ways as well. They harbor insect pests and plant diseases and on account of their rapid regenerative powers they pose serious problems in our daily life in maintaining our gardens, lawns, roads and water channels [8]. Decrease in the yield of crops due to weed infestation has been well documented [9]. This paper emphasize on the basic fodder establishment, weed population and their relationships, how they compete with fodder to utilize the fertilizers, how the population trend with various kind of organic fertilizers. This study may helpful to fodder growers to realize the hazardous of weeds and efficient application of selective organic fertilizers.

II. METHODOLOGY

A. Selection of land

Field experiment was conceded out on the land of fodder establishment over decades in Chenkalady area of Batticaloa region, are belongs to Low Country Dry Zone (DL) of Sri Lanka. The mean annual rain fall is 2056mm and the mean annual temperature is 28.5°C. Soil type was sandy loamy with moderate fertile and well-drained soil.

B. Selection of planting material

CO3 cuttings were procured from the Department of agriculture, Sri Lanka with good quality and vigorous criteria. The uniform cutting selected with 15 cm of length, 2 cm of diameter and consist 3 nodes.

C. Field experiment

The experimental site was cleared, ploughed, harrowed and divided into different plots were arranged as RCBD model. Each plot size was 6 × 3m (18 m^2).

Combination	Cattle manure (kg/ha)	Poultry manure (kg/ha)	Goat manure (kg/ha)
C1 (3:5:2)	6	10	4
C2 (2:2:1)	8	8	4
C3 (5:3:2)	10	6	4
C4 (3:1:1)	12	4	4
C	0	0	0

Table 1: Experimental combinations of organic manures

There were four combinations of organic manures and a free of any organic amendments, applied at 20 ton/ha of each combinations and a control applications (no any organic fertilizer) displayed in Table 1. The organic amendments were incorporated with topsoil using hand trowel one week before planting the cuttings. Cuttings were planted at a spacing of 60 x 60 cm. After planting, irrigation was done every mornings and evenings. Weed population was determined from seven days after planting and continued at one week interval until harvesting.

D. Botanical composition of weeds

$$\text{Narrow leaf weeds (\%)} = \frac{\text{Total number of narrow leaf weeds}}{\text{Total number of weeds}} \times 100$$

$$\text{Broad leaf weeds (\%)} = \frac{\text{Total number of broad leaf weeds}}{\text{Total number of weeds}} \times 100$$

1 m^2 was selected randomly using quadrat at each experimental plot. Weeds are identified and categorized in to broad leaf weeds and narrow leaf weeds. Total numbers of weeds were counted according to their set.

E. Statistical analysis

The average population of weeds was analyzed using ANOVA F test, and the treatment means were compared using Duncan multiple range test at 5% level of significance [10].

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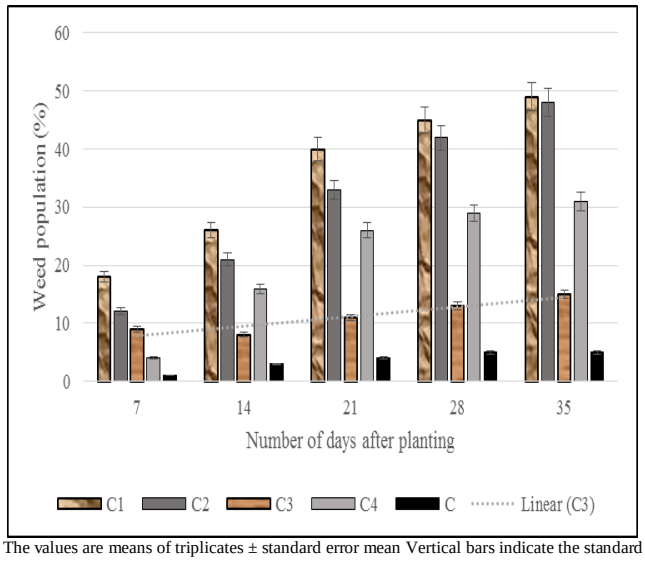
III. RESULTS

The weed population is greatly influence in the establishment of CO3 grass by compete with their organic fertilizer requirement. The results revealed that the weeds population show significant differences ($p > 0.05$) with the different combination of organic manure application, are shown in figure 1 and 2 respectively.

Results in figure 1 showed that broad leaves population is highest in plot treated with combination of C1 (3:5:2) followed by C2 (2:2:1), C4 (3:1:1), moderate in C3 (5:3:2) and eventually, least in plot treated with no any organic fertilizer application (control).

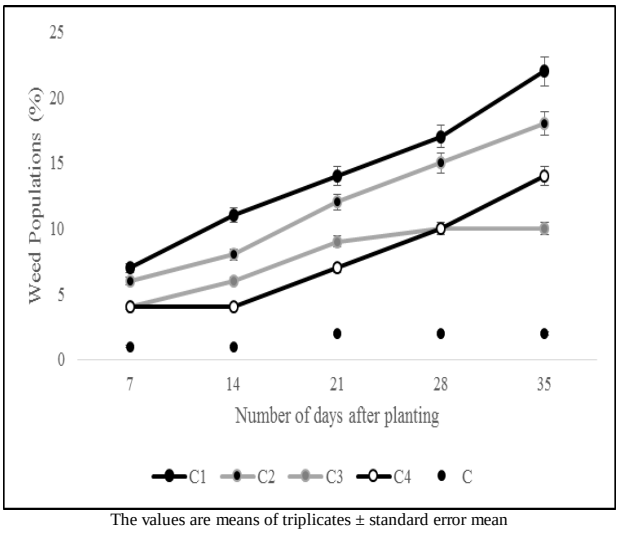


The values are means of triplicates ± standard error mean Vertical bars indicate the standard error

Figure 1: Broad leaves weed population with different kind of organic fertilizer application.

Broad leaf weed population is dominantly increased in the plot of treated with combinations of C1 and C2 application compared to other combinations. In case of C4 treated plot has slow rate of increasing trend of weed population at initial period and then converted into accelerated trend like C1 and C2. Since, weed population of C3 treated plot exposed in moderate increasing pattern compared to other combinations. Furthermore, plot with free organic fertilizer application showed more or less equal population up to the harvesting stage of CO3, compared to other kind of treatments.

Narrow leaf weed population also show the more or less similar pattern of increasing trend of population rate with different kind of organic fertilizer combinations. Though, broad leaf weed population percentage is significantly high compared to narrow leaf weed population in treated plots with number of days after planting. And also, C1, C2 and C4 treated plots have sharply increasing trend of narrow weeds population compared with C3, which expressed that more or less equal weed population trend pattern.

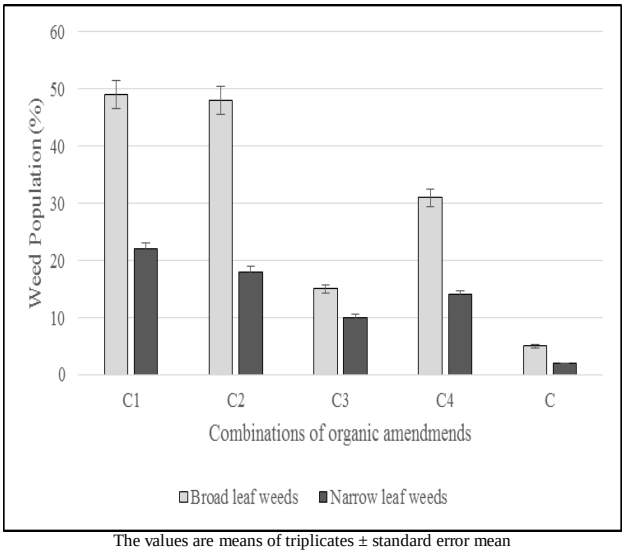


The values are means of triplicates ± standard error mean

Vertical bars indicate the standard error

Figure 2: Narrow leaves weed population with different kind of organic fertilizer application.

Results in Figures 1 and 2 are revealed that broad leaf weed population show dominantly increasing population trend compared to narrow leaf weed population. Results of narrow and broad leaves weeds population with different combinations of organic fertilizer application at nearest to harvesting stage (35 days after planting) are shown in Figure 3. Broad leaf weed population rates are in highest range (≠ 49%) compared to narrow weed population (≠ 17%) in plots treated with different kind of organic manure combinations. There are prominent deviation pattern in both group of population at nearest to harvesting stage of CO3 grass.



The values are means of triplicates ± standard error mean

Vertical bars indicate the standard error

Figure 3: Narrow and broad leaves weeds population with different kind of organic fertilizer application at nearest to harvesting stage (35 days after planting).

IV. DISCUSSION

This study discovered that weed incidence is high with the application of organic amendments rather than assembly of no any fertilizers applied to CO3 established field. Fertilizers are substances containing chemical elements such as manure or mixture of nitrates that improves the growth of plants [11]. C1 and C2 combination were well support to weed population, because, they contained higher proportion of poultry manure compared to other organic manures. Poultry manure contains useful soil nutrients that are needed for the growth of plants [12]. Combination of C4 limited to lesser quantity of poultry manure compared to C1, C2 and C3, which expressed different trend at initial period of planting duration. Composition of poultry manure are in the form of crude that is released slowly to the soil [13].

In case of C3, which contain moderate amount of cattle manure, poultry manure and goat manure with 5:3:2 ratio, at which optimum level of weed population also was maintained along with peak grass performances. This may be due to the optimum level of nutrient supplied to the soil, grass and also weeds. Poultry, cattle and goat manures were facilitated the provision of prime nutrients for vegetative growth such as nitrogen and carbon to the grass and weeds. Hybrid Napier grass fertilized with adequate organic manure especially poultry manure (2.62% nitrogen, 2.8% phosphorus and 2.82% potash) produced higher yield than those applied with inorganic fertilizer [14]. And also weed incidence are also high in case of highest dose of poultry manure and cattle manure application considered for this study. Even though, organic fertilizer applications enhance the performance of CO3 and suppress the population of weed with ideal recipes of manures. Furthermore, broad leaf population weeds were highest compared to narrow leaf weeds this may be due to the broadleaf weeds that are biennial or perennial are generally more competitive than grassy weeds [15].

Therefore, best quality and highest yield of CO3 can be obtained by using ideal combinations of various kind of organic manures with best weed management. This study can be undertaken further to minimize the weed population with the optimum variety of organic fertilizer combinations, effect of weeds on the nutritional quality of CO3 grass elite variety and milk quality of dairy cattle.

V. CONCLUSION

Sri Lanka is an agricultural nation. It needs to increase the milk production in the country up to a considerable level. It is very clear that this target must combine with good quality green forages. CO3 grass is an important fodder grass that produces a lot of high protein and energy rich forage and, this is a real way out for land limited dairy farmers. Therefore, effective usage of exist resources are very valuable and necessary. To obtain the best performance of fodder grass, with minimum disturbance of weed incidence can be achieved by the way of ideal combination of varietal organic manures such cattle manure: poultry manure: goat manure (5:3:2). Managing and controlling the weeds and their population enhance the quality of fodders with efficient use of organic amendments. Eventually, it may leads to increase the overall production and productivity of agribusiness.

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