Studies on Persian clover (Trifolium resupinatum)

Part I: Effect of harvesting intervals on the crop yield and its total nitrogen

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Abstract. Yields of green fodder, dry matter and nitrogen were adversely affected by an increase in the harvesting interval of Persian clover from 40 to 100 days. The optimum harvesting interval which gave maximum yield of green fodder (86.6 ton/ha) and dry matter (11.2 ton/ha) was 30 days. The maximum yield of total nitrogen (423 kg/ha) was obtained when the harvesting interval was 20 days.

Introduction

Much work has been done in Great Britain [1-3], Sweden [4] and India [5-7] to increase the yield of protein per unit area per annum. Nazir and Shah [8] studied extractability of protein from leafy plants that grow abundantly in Pakistan and reported that leguminous and cruciferous plants gave maximum yield of protein. The suitability of indigenous grasses for leaf protein production was also studied (Shah F.H. unpublished). Preliminary studies with Persian and Egyptian clovers, which are cultivated in Pakistan over 1.5 \times 10^6 ha of irrigated area and are used as fodder, showed that edible protein could be easily extracted on a large scale from these crops (Bureau of Statistics, Government of Pakistan – Private Communication).

This paper deals with the effect of harvesting intervals on the yields of green fodder, dry matter and nitrogen from Persian clover (T. resupinatum).

Experimental

Field techniques

Seeds of Persian clover (T. resupinatum) were obtained from the Punjab Agricultural Research Institute, Faisalabad, Pakistan. The seeds (50 g) were sown in 15.0 sq.m plots selected at random, by broadcasting in standing water in October. Eight replicas were set up for each treatment. The crop was harvested at 20, 30, 40, 60, 80 and 100 days intervals. Harvesting of the crop was started in the middle of November and continued until the middle of May. Each harvest was analysed for its dry matter and nitrogen content. The
data for green fodder and dry matter yields were also analysed by standard statistical methods of ‘Analysis of Variance’ and the least significant difference (LSD) was calculated.

Moisture content of the crop was determined by drying the sample at 100 ± 2°C for 24 hours. Nitrogen content of the crop was estimated by a micro kjeldahl method using K2SO4:CuSO4:SeO2 (9:1:0.02) catalyst [2].

Results and discussion

Effect of atmosphere temperature and relative humidity

Dry matter varied from 9.5 to 13.0% and nitrogen content (as % of D.M.) ranged between 3.9 to 5.0% in the regrowths harvested during the mid November to March (Figure 1). During these months atmospheric temperature ranged from 5.1 to 13.1°C minimum and from 19.3 to 27.8°C maximum, whereas the relative humidity varied from 66 to 90% in the mornings and 35 to 54% in the evenings. The dry matter increased from 13.0 to 57% and nitrogen content decreased from 5.0 to 1.9% in the regrowths harvested in the months of April and May. Such rapid changes in the composition of the regrowths seems to be due to an increase in the atmospheric temperature maximum from 27.8 to 40.2°C and minimum from 13.1 to 26.8°C that was accompanied by a fall in the relative humidity up to 22% in these two months.

Effect of different harvesting intervals

Each treatment gave different numbers of harvests within a season. The yields of green fodder, dry matter and nitrogen varied considerably among the 1st cuts and regrowths (Figure 2). The crop harvested at an interval of 20 days gave nine cuts (1st cut and regrowths) in a season. The yield of green fodder and dry matter in the regrowths varied from 4.9 to 15.7 and 0.6 to 1.8 ton (metric)/ha respectively and nitrogen ranged from 30 to 80 kg/ha. The crop harvested at an interval of 30 days gave six cuts whereas that harvested at 40 days interval gave five cuts. The last regrowth in the later case was harvested at the age of 20 days because the growing season of the crop was over. The yield/ha of green fodder and dry matter in 30- to 40-day-old regrowths ranged between 9.1 to 25.5 and 1.2 to 2.9 tons respectively whereas nitrogen yield was between 50 to 110 kg/ha. The crop could be harvested only 2 or 3 times in a season when the harvesting interval was increased to 60 days or more. Comparison of the results showed that 60-day-old 1st regrowths gave maximum yield of green fodder 21.09 ton/ha. Eighty-day-old 1st regrowths produced maximum dry matter 4.65 ton/ha and nitrogen 148 kg/ha.

Harvesting of the crop at an interval of 20–40 days affected negligible the total yield of green fodder and dry matter which ranged from 80.3 to 86.6 and 10.2 to 11.2 ton/ha respectively (Figure 3). An increase in the