DEVELOPING *Dactylus glomerata* (COCKSFOOT) AS FORAGE CROP IN THE KARAKORAM VALLEYS IN NORTHERN AREAS OF PAKISTAN

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ABSTRACT

Keeping in view the acute shortage of fodder and forages in the Northern Areas of Pakistan, an experiment was conducted in Karakoram Agricultural Research Institute (KARINA) in late November, 1984 and continued for 3 years to evaluate the performance of *Dactylus glomerata* under two temperature regimes. The treatments included covering the plots with polyethylene sheet and without cover. The covered seed took 19 days to germinate whereas the uncovered seed took 89 days to germinate. Plant height was 65.5 and 42.5 cm and the fresh matter yield was 38.0 and 30.0 t/ha for the covered and uncovered treatments respectively during the first growth year. No significant difference was observed in the growth during the 2nd and 3rd years in both the treatments. The plant height and fresh yield of the covered crop during the first year was high as compared to that uncovered crop due to high temperature under the polyethytene sheet It is also brought about early germination, whereas the low temperatures delayed the germination by 70 days.

INTRODUCTION

Northern Area of Pakistan extends over 69,620 sq kilometers. Out of this only 600 square kilometers is under irrigated agriculture, 2816 sq kilometers is under forest and the rest is under mountains, peaks, glaciers, waste lands and streams. The annual rainfall is between 75 to 150 mm which is not sufficient for agricultural crops. Therefore, agriculture crops are irrigated both in single and double cropping systems (PARC, 1984).

Northern Area falls under arid zone with negligible rainfall, severe cold in winter and hot in summer. All mountains, slopes, range and waste lands are devoid of vegetation, grasses and shrubs. Thus, fodder and forage crops can be raised only with artificial irrigation (Hudson, 1982). Small land holdings, short growing season and lack of incentives are the major constraints in developing fodder as a crop in the irrigated fields. This situation has created great shortage of fodder due to which the farmers near limited number of livestock. The cattle are generally fed dry straw of maize, lucerne and wheat during winter and tree fodder of willow, apricot, Russian olive, etc. in early spring. Livestock are shifted to seasonal alpine pastures from June to September each year and therefore, the pressure of free grazing in the valleys reduces. The scientific system of pasture development and grazing is yet to be introduced in the area (Whiteman,1985).

The cost of dry straw of maize and wheat is Rs.0.75 and Rs.1.00/kg respectively whereas dry lucerne costs Rs.2/kg in the market. When the farm production reduces due to droughts and diseases the cost of dry lucerne shoots up to Rs.5/kg. No pasture is available in the valleys and therefore, the livestock remains in the barns and cattle sheds for more than half of the year. Besides, the dry straw is not nutritious for maintaining proper health of the animals (Saunders, 1983). In order to identify a suitable

nutritious forage crop, a number of grasses were planted in KARINA. Amongst others, *Dactylus glomerata* has shown good adaptation in the Northern Areas. The studies have also revealed that *Dactylus glomerata* is nutritious, can be grown in orchards and on the borders of fields/terraces. According to Martin et al. (1975) *Dactylus glomerata* grows naturally in many parts of the world for pastures, silage and hay making. It has pronounced growth when mixed with clover and alfalfa. It thrives well under cool, humid, moist and irrigated conditions but is also tolerant to heat and drought. *Dactylus glomerata* shows good performance in orchards under the shade of trees. Stewart (1961) deserved that *Dactylus glomerata* naturally grows in the alpine pastures (Deosai Plains) of Northern Areas which during his visits in 1940 and 1966 in connection with survey of flora of Deosai.

Keeping this in view *Dactylus glomerata* was tested in the Agricultural Research Institute for Northern Areas in order to study its performance and evaluate the adaptation for pasture development and fodder production .

METHODOLOGY

The experiment was carried out at Juglote (KARINA) IN 1984 on a sandy loam soil with underlying gravel below. The soil is very porous with low water holding capacity and poor organic matter contents and pH of about 8. The experiment was designed in randomized complete block (RCB) with 3 replications. Plots in first treatment were covered with polyethylene sheet and in the second treatment the plots were kept uncovered. Sowing was done at the onset of winter i.e. late November, 1984.

Land was irrigated one week before and ploughed twice before sowing. When the moisture in the field was sufficient for germination, plots were prepared and sown with seed during the 3rd week of November 2 cms below the surface of the soil. Fertilizers were applied @ 75,75,0 (NPK) kg/ha. Thirty percent fertilizer (N) was applied during sowing, 30% when the crop attained 20 cm height and 40% after first cut whereas phosphatic fertilizer was applied as basel treatment. The fertilizer application was repeated in subsequent years e.g. P before first cut, N in two split doses (50% before first cut and 50% after first cut. Weeds were removed and plots irrigated by flood system. Temperature was recorded from the agro meteorological station of KARINA. The crop was retained for 3 years (1985-1987) to collect the data on various growth parameters.

RESULTS AND DISCUSSIONS

Temperature Effect on Germination

Dactylus glomerata seed was sown in November 22nd, 1984 at the beginning of winter. The seed covered with polyethylene sheet germinated after 19 days whereas uncovered seed took 89 days to germinate indicating pronounced effect of high temperature on germination. The seed under polyethylene sheet cover received heat because of which the seed germinated early. On the other hand the germination of uncovered seed was delayed by 70 days because of its exposure to frost and low temperature in winter. The uncovered crop germinated during February after expiry of frost period this large difference in germination period (70 days) clearly shows that the high temperature enhances the germination of the covered seed and the low temperature delays the germination of uncovered seed. The results indicate that cocksfoot has less resistance to wintered. Martin et al. (1975) have also reported that *Dactylus glomerata* has low resistance to cold which confirms the results of this investigation.

Temperature Effect on Fresh Biomass

The results of this investigation indicate that temperature had pronounced effect on the fresh straw yield. In 1985 the estimated total fresh matter yield of covered crop was 38.0 t/ha whereas the uncovered crop yielded 30.0 t/ha. The covered crop produced 45.0 and 38.6 t/ha of fresh matter yield whereas the uncovered crop yield was 40.0 and 36.7 t/ha in 1986 and 1987 respectively (fig 2). The higher production of covered crop in 1985 is attributable to the higher temperatures during the early stages and more growing days as compared to the uncovered crop with low temperature and less growing days. The production under both the treatments showed no significant difference during 1986 and 1987 which indicates that the crop received equal growing days and temperature. The low production in the third year is due to the disease attack with adverse effect on the growth. The fresh matter yield of the two temperature regimes was significant at 5% significance level in 1985 and was insignificant during 1986 and 1987. The fresh matter yield of first cut was higher and reduced in the second cut in both treatments. The higher production in the first cut is because of the longer growing period and the low fresh matter yield in the second cut may be the result of low temperatures in August and imbalance caused by fertilizer application with early harvest.

Regrowth and Multiple Cuts

Dactylus glomerata remained dormant during winter e.g. from November to February like other perennial grasses and regained growth with the rise in temperature during March. The leaves of the crop first turned pale and then dried during the frost period and the growth rate ceased altogether. The crop showed encouraging performance during the 3 year growth period proving its perennial behaviour. Only two cuts of the crop were obtained each year with longer intervals. Laurene (1979) has reported that cocksfoot is not winter tolerant. But when moved it grows back vigorously and flowers again, which confirms the above results.

Temperature and Plant Height

The average height of *Dactylus glomerata* was 65.5 cm in the covered and 42.5 cm in the uncovered treatment. The height growth of the covered crop increased to 68 cm in 1986 and then decreased to 56 cm in 1987. Similar trend was also observed in uncovered crop (Fig 3). The increase in height in covered crop in 1985 is due to high temperatures and more growing days and the decrease in height in the uncovered crop is due to the climatic stresses and short growing season. Significant difference in height was observed at 5% level of significance only in 1985.

No significant difference in height of the crop in the two treatments was observed during 1986 and 1987 indicative of equal temperatures and growing days. Under optimal management and climatic and environmental conditions the crop of both the treatments showed similar height. Laurence (1979) stated that the height of *Dactylus glomerata* ranges between 45 cms to 150 cms which is in conformity with the results of this investigation.

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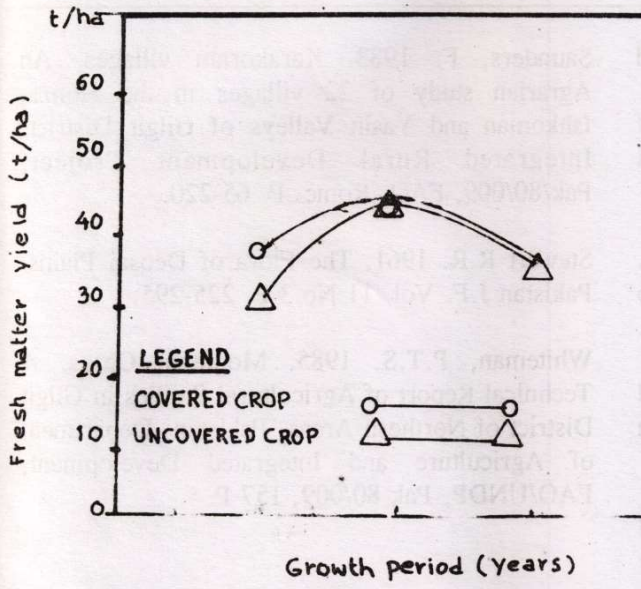

Fig 2. Fresh matter yield under the two temp Conditions

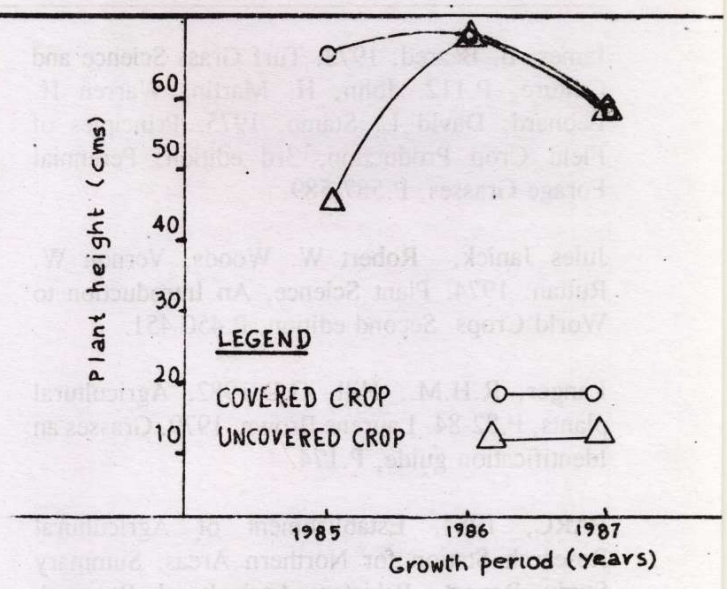

Fig 3. Plant height under the tw temperature conditions.

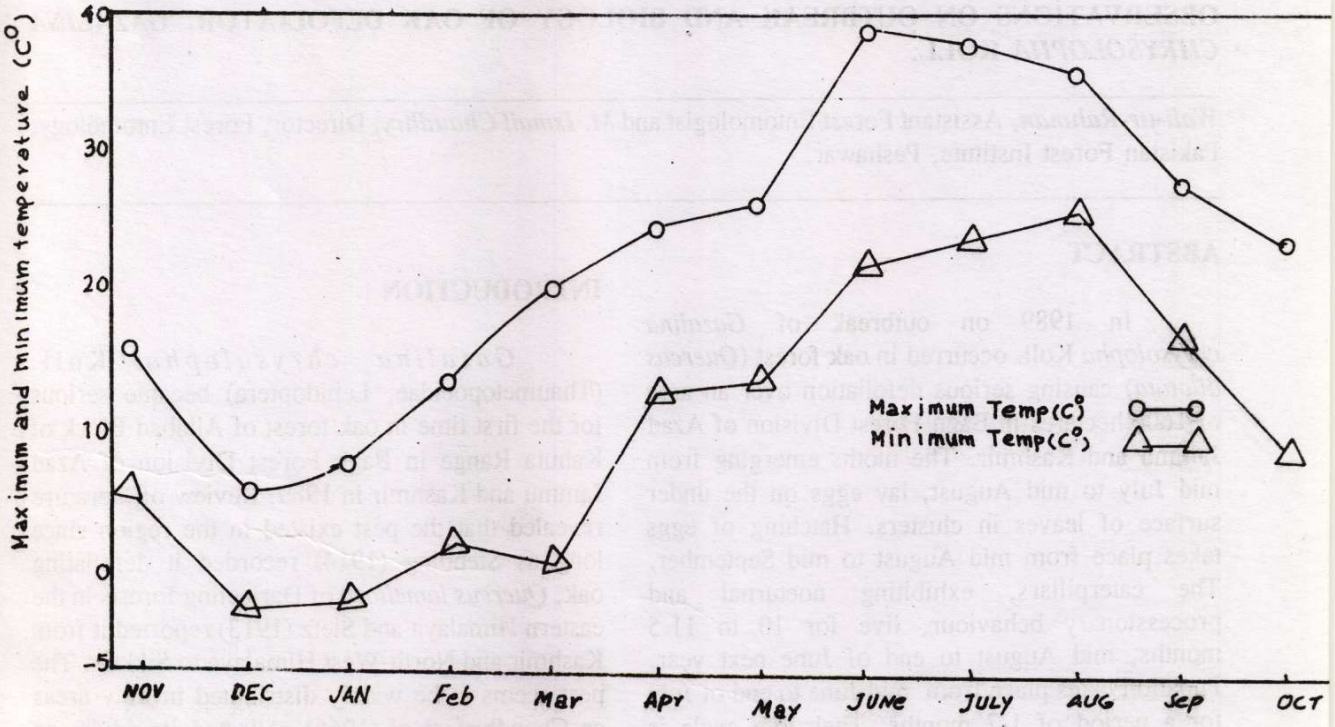

Fig 1. Mean monthly maxi. and mini temperatures during the first growing season of Dactylus glomerata (1985)

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