# EFFECT OF CLIPPING FREQUENCY OF SOME FODDER GRASSES IN THE SEMI-ARID REGION OF TAMIL NADU, INDIA.

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**ABSTRACT**
Clipping frequency and water stress play a major role in the biomass production of grasses. Bajra - Napier $BN_2$ and $CO_1$ showed maximum above ground biomass under monthly clipping without water stress. The above ground biomass of Bajra-Napier $BN_2$, *Panicum maximum* Hamil and Guinea grass were not affected under weekly and fortnightly clipping with water stress. Water stress affected the monthly clipped and unclipped plant above ground biomass but the below ground biomass increased in all the fodder grasses except *Brachiaria mutica*.

**KEYWORDS**
Clipping, water stress, grasses, biomass, production.

**INTRODUCTION**
Forage species, in general are characterished with regeneration potential following defoliation, cutting or grazing. The more severe the defoliation the more markedly production is reduced (Crider, 1955). Singh (1967), Lawrence and Ashfold (1969), Mall and Singh (1977) concluded that increasing the length of clipping intervals results in significant increase of yield in organs. It has been shown that the carbohydrate reserves in the below ground organs are drastically reduced by intensive defoliation. Reserves in the below ground parts of plants have been shown to be utilized for regrowth (Trlica and Cook, 1971, 1972; Bokhari and Singh, 1974; Owensby et al., 1974).

The knowledge of proper intensity and interval of clipping of forage plants, therefore becomes essential to evolve suitable utilization standards. Water is also a very important factor in determining productivity. Moreover in semi-arid regions of Eastern Ghats, water availability is a critical phenomenon because of poor rainfall. Hence this study was carried out to determine the effect of water stress and clipping.

**MATERIALS AND METHODS**
Uniform sized tillers of five fodder grasses collected from Pudukottai Fodder Research Station were transplanted into mud pots filled with a mixture of soil and farmyard manure (3:1) at Madurai Kamaraj University, Biomass Research Station. Two levels of water stress (1WHC & 1/2 WHC) were maintained as described by Pande and Singh (1981). Under each water condition plants were divided into four sets (18 pots per set) one set was treated as control (Unclipped) and one each was subjected to weekly, fortnightly and monthly clipping treatments. First clipping was identified at time zero. Clipping height (7cm from the base of tiller) was fixed so as to remove 80% shoot, by volume, from each plant and on subsequent sampling the same height was maintained. Three plants from each treatment were selected at random for harvest at time zero and at subsequent day intervals for about 90 days. The harvested plant material was separated into root and shoot components and dried at 80° C until constant weight was reached. The weight of the material clipped between the sample dates $S_1$ and $S_2$ was added to the shoot or root weight for the sampling dates $S_2$.

**RESULTS**
**Above ground biomass:** Figure 1 shows the above ground biomass production of fodder grasses to various clipping treatments. Among the five grasses studied *Brachiaria mutica* was not affected much by weekly clipping (15.2 g/pl). Bajra Napier $BN_2$ (38.1g/pl) and Bajra-Napier $CO_1$ (34.1 g/pl) showed maximum biomass production under monthly clipping whereas *Panicum maximum* Hamil and Guinea grasses showed maximum biomass when there was no clipping.

Figure 2 shows the above ground biomass production of fodder grasses to water stress with various clipping intervals. Above ground biomass production of *Brachiaria mutica* under water stress showed only 69.7%, 74.8%, 64.9% and 89.7% under weekly, fortnightly, monthly clipped and unclipped respectively. Weekly and fortnightly clipping under water stress did not affect the above ground biomass production of Bajra-Napier $BN_2$, *Panicum maximum* Hamil and Guinea grasses. Water stress affected the above ground biomass production of all fodder grasses in monthly and unclipped plants.

**Below ground biomass:** Table 1 shows the below ground biomass production to various clipping treatments under two soil-water condition. Below ground biomass production of all fodder grasses were very much affected by clipping. Water stress enhanced the below ground biomass of all fodder grasses except *Brachiaria mutica*, which showed 79.6%, 87.5%, 84.5% and 85.6% below ground biomass in weekly, fortnightly, monthly and unclipped treatments respectively.

**DISCUSSION**
Among the five species studied, above ground biomass production of *Brachiaria mutica* was not affected much by frequent clipping. Bajra-Napier $BN_2$ and $CO_1$ showed maximum above ground biomass production during monthly clipping. Such results were also recorded by other workers in different plants. (Singh, 1967; Lawrence and Ashfold, 1969; Mall and Singh, 1977). However too frequent clipping not only reduced the yield but also affected the plant survival (Crider, 1955). Weekly clipping greatly reduced the above ground biomass production of Bajra-Napier $BN_2$ and $CO_1$ and *Panicum maximum* Hamil and Guinea grasses and may be due to reduced photosynthetic area. Water stress under weekly and fortnightly clipping did not affect the above ground biomass production of Bajra-Napier $BN_2$, *Panicum maximum* Humil and Guinea grasses where as it affected the below ground biomass production of all fodder grasses under monthly and unclipped treatments. This may be due to larger leaf transpiration area which increase the water stress by greater water transpiration of the leaf.

Clipping treatment affected the below ground biomass of all fodder grasses. Downward translocation is limited under frequent clipping causing retardation in root growth and so below ground biomass production of all fodder grasses was affected. This agrees with the finding of Cook et al. (1950). Fennema & Briede (1990) showed that increased frequency of clipping significantly reduce the below ground biomass. Water stress enhanced the below ground biomass was due to stimulation of root growth. It is concluded that maximum forage yield can be obtained from Bajra-Napier $BN_2$ under monthly clipping.

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**Table 1**

Below ground biomass production of five fodder grasses subjected to various clipping treatments under two soil-water conditions, (90 days treatment).

| Treatment | | Belowground biomass g/plant | | | | |
|---|---|---|---|---|---|---|
| | | BM | $BN_2$ | $CO_1$ | PA | PM |
| Weekly | 1WHC | - 10.8 | 5.8 | 3.7 | 2.5 | 3.2 |
| clipped | 1/2WHC - | 8.6 | 6.6 | 6.4 | 3.3 | 3.9 |
| Fortnightly | 1 WHC | 11.2 | 9.0 | 4.5 | 4.2 | 3.9 |
| clipped | 1/2WHC | 9.8 | 10.1 | 7.3 | 8.6 | 4.3 |
| Monthly | 1WHC | 12.1 | 17.0 | 11.4 | 6.5 | 5.5 |
| clipped | 1/2WHC | 10.2 | 19.3 | 12.3 | 8.9 | 6.1 |
| Unclipped | 1WHC | 14.6 | 23.0 | 18.0 | 11.5 | 10.4 |
| | 1/2WHC | 12.5 | 27.0 | 21.4 | 12.8 | 11.5 |

BM - *Brachiaria mutica*

$BN_2$ - Bajra-Napier $BN_2$

$CO_1$ - Bajra - Napier $CO_1$

PA - *Pamicum maximum* (Hamil grass)

PM - *Panicum maximum* (Guinea grass)

WHC - Water Holding Capacity

**Figure 1**

Above ground biomass (1 WHC)

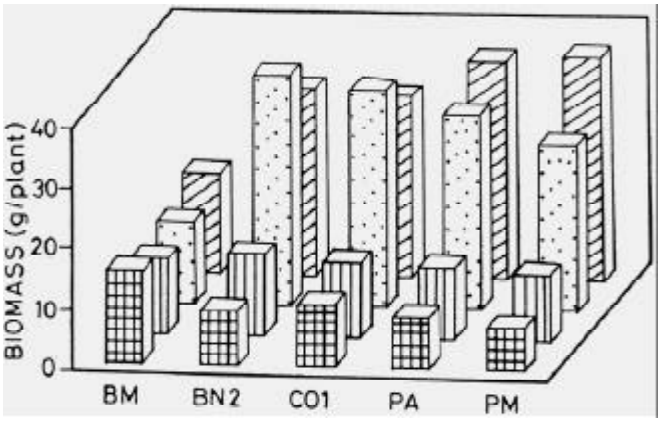
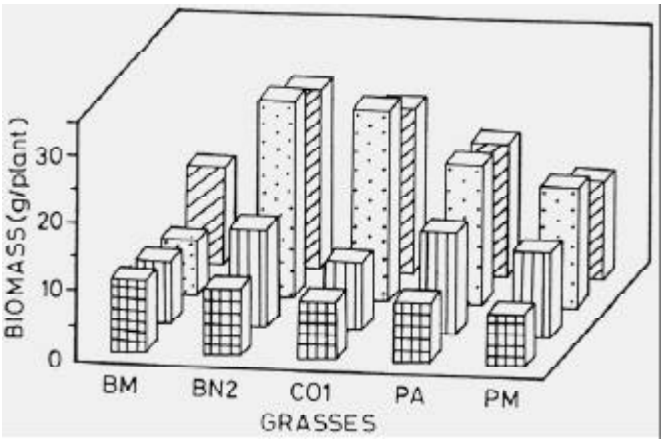



**Figure 2**

Above ground biomass (1/2 WHC)




**Figures 1 & 2:** Biomass production of five fodder grasses subjected to various clipping (90 days treatment).