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# Impact of mowing height and mowing interval on C. *dactylon* × C. *transvaalensis* Tifdwarf

**Medha Saha and Pooja Gupta**

**Abstract**
The present investigation entitled "Impact of mowing height and mowing interval on *C. dactylon* ×*C. transvaalensis* 'Tifdwarf'" was accomplished at Indira Gandhi Krishi Vishwavidyalaya, Raipur, 2020-21. The experiment was conducted in Factorial Randomised Block Design with treatments consisting of three mowing heights (3 cm, 6 cm and 9 cm) and three mowing intervals (7 days, 11 days and 15 days) replicated three times. Mowing the lawn on a regular basis makes the lawn aesthetically appealing, maintain its health and helps to keep the grass short, neat and even. In the present findings for *C. dactylon* ×*C. transvaalensis* 'Tifdwarf' at 3 cm mowing height and 7 days mowing interval was found best, with maximum shoot density, clipping yield, total chlorophyll content, chlorophyll a and chlorophyll b.

**Keywords:** *C. dactylon* ×*C. transvaalensis* 'Tifdwarf', mowing heights, mowing intervals

## Introduction
Mowing is defined as the act of cutting or levelling down grasses at a particular height with mowing machine or tool at certain interval to maintain proper quality turf. Turf culture and mowing are indispensable part of each other. Without mowing one cannot maintain quality turf grasses. Mowing the lawn serves a two-fold purpose. First, the cosmetic benefits can be noticed immediately. A properly cut lawn is something that is very pleasant to behold. Second, mowing the lawn helps keep your lawn healthy and eliminate some of the pests from the grass at the same time. Mowing remains one of the most fundamental and energy-intensive cultural practices in maintaining a turf sward. Even with adequate moisture, fertility, and pest control, incorrect mowing can be detrimental to plant growth, function, and persistence (Law *et al.* 2016) [7]. Consistency in mowing is important to both health and appearance. It is recommended to mow frequently and not to remove more than one-third of the leaf blade in a single mowing, which is known as the "one-third rule" (Reicher *et al.*, 2006) [6]. With every cut, the best shoots will proliferate making the grass much more visible in nature overall. Evenly mowing of turf area allows equal opportunity to soak up all the resources like sun and water. This keeps your bed of green heaven i.e. lawn growing evenly. Law *et al.* 2016 [7] found a direct relationship between growth rate and mowing frequency. Quicker the growth a greater number of mowing is required. Simmons *et al.* (2011) [13], found that mowing height of 2.00 to 8.00 cm can be maintained for *Cynadon dactylon* according to intention of work and use. Mowing height to be maintained depends upon the for the turf purpose of its establishment. Tucker, 2006 [14] found *Cynadon dactylon* Tifeagle maintained at ≤ 3.2mm provides standard golf green putting surface, while for home lawns and parks weeping grass mowing height can be 2.50 cm and mowing frequency can be 14 days. Increasing the frequency of mowing decreases the growth rate of these species (Carlson *et al.* 2018) [2]. Various species and cultivar of grasses, environment in which they are grown, cultural and management practices etc. varies its response to different mowing height. To acquire good quality lawn with minimum maintenance cost it is inevitable to find proper mowing height and frequency.

## Materials and Methods
Experiment was carried out to standardize the mowing requirement of *C. dactylon* ×*C. transvaalensis* 'Tifdwarf'. Randomised Block Design (Factorial) with three replications was carried out in this present experiment. Grasses were planted in plot of 2m × 1m by dibbling method and was light rolling was done immediately after transplanting. They were maintained using standard cultural practices. Irrigation was provided as per requirement in different months. Fertilization dose of 150: 100: 100 kg N P K $ha^{-1}$ per year was given.

Nitrogen was given in three split doses. Phosphorus and Potash was applied as basal dose at the time of planting. Treatments consists of three mowing heights (H1-3 cm, H2- 6 cm and H3-9 cm), three mowing intervals (I1-7 days, I2- 11 days and I3- 15 days) and their interaction.

Various parameters like Shoot density (numbers/ 100 $cm^2$) (Ntoulas *et al.* 2011 and Murdoch *et al.* 2007) [10, 9], Shoot dry weight (g/ 100 $cm^2$) (Joo *et al.* 2008) [5], Root length (cm) (Sangma *et al.* 2015), Root dry weight (g) (Wherley *et al.* 2009) [16], Clipping yield (g/100 $cm^2$) (Law *et al.* 2016) [7], Total Chlorophyll content (Sangma *et al.* 2015) was estimated.

Shoot density was calculated by counting the No. of shoots present in 100 $cm^2$ area. For Shoot dry weight above ground shoots from an area of 100 $cm^2$ was cut and then dried in hot air oven at 60° C for 72 hours and dry weight was measured. Root length was measured by taking out soil core samples up to a depth of 30 cm. Roots were washed carefully and then the longest root was measured using a geometric scale. Root dry weight was measured by drying the roots after separating the soil at 60 ° C for 24 hours. Clipping yield was estimated by taking samples at respective mowing heights before mowing and drying them in hot air oven at 60 ° C for 24 hours. All the chlorophyll content was estimated using Acetone method. Spectrophotometer was used to calculate the optical density of the extract which is measured at 663nm and 645 nm, since maximum absorption of Chlorophyll takes place at these wavelengths respectively. The amount of chlorophyll content was determined using formula given by Arnon (1949) [1].

## Results and Discussion

The data is represented in table no. 1 to 6. The highest shoot density was measured at mowing height 3cm with 7 days mowing interval (493.45 numbers/ 100 $cm^2$), while the lowest was observed in mowing height 9cm with 15 days mowing interval (253.00 numbers/ 100 $cm^2$). Due to mowing there is loss of leaves and to compensate that loss they produce more shoots to accumulate more carbohydrates for growth by increasing the photosynthesising area. So, increase in shoot density with the decrease in mowing height and mowing interval. The findings are in close conformity with the findings of Sangma *et al.* (2015), Ntoulas *et al.* (2011) [10] and Murdoch *et al.* (2007) [9].

**Table 1:** Shoot Density number per 100 $cm^2$

| **Shoot Density (numbers per 100 cm2)** | |
|---|---|
| **Treatments** | **Treatments Mean** |
| Mowing height | |
| H1 | 473.33 |
| H2 | 367.22 |
| H3 | 286.66 |
| SE(m) | 3.19 |
| CD | 9.57 |
| Mowing interval | |
| I1 | 389.70 |
| I2 | 361.77 |
| I3 | 326.63 |
| SE(m) | 3.19 |
| CD | 9.57 |
| Interaction | |
| H1I1 | 493.45 |
| H1I2 | 453.21 |
| H1I3 | 397.89 |
| H2I1 | 378.33 |
| H2I2 | 356.11 |
| H2I3 | 329.00 |
| H3I1 | 297.31 |
| H3I2 | 276.00 |
| H3I3 | 253.00 |
| SE(m) | 5.53 |
| CD | 16.58 |

Lower mowing height in turfgrass increases the frequency of mowing, which decreases the biomass accumulation and ultimately the growth rate of the species is reduced which is an immune response (Carlson *et al.* 2018 and Turgeon, 1980) [2, ]. It was evident that shoot dry weight at 6cm mowing height and 15 days interval had maximum shoot dry weight (5.67 g/ 100 $cm^2$), while the lowest was recorded in (2.53 g/ 100 $cm^2$) 9cm mowing height and 15 days interval. Findings of Sangma *et al.* (2015), Murdoch *et al.* (2007) [9] in Cynodon and Joo *et al.* (2008) [5] in Zoysia grass, were similar to the findings of present investigation.

**Table 2:** Shoot Dry weight (g/ 100 $cm^2$)

| **Shoot Dry weight (g per 100 $cm^2$)** | |
|---|---|
| **Treatments** | **Treatments Mean** |
| Mowing height | |
| H1 | 3.29 |
| H2 | 3.93 |
| H3 | 3.72 |

| | |
|---|---|
| SE(m) | 0.03 |
| CD | 0.10 |
| Mowing interval | |
| I1 | 3.61 |
| I2 | 3.68 |
| I3 | 4.01 |
| SE(m) | 0.03 |
| CD | 0.10 |
| Interaction | |
| H1I1 | 2.75 |
| H1I2 | 3.83 |
| H1I3 | 3.83 |
| H2I1 | 3.40 |
| H2I2 | 4.45 |
| H2I3 | 5.67 |
| H3I1 | 4.67 |
| H3I2 | 2.76 |
| H3I3 | 2.53 |
| SE(m) | 0.06 |
| CD | 0.17 |

Longest root length was reported in (28.31 cm) 6cm mowing height and 15 days interval, while smallest (24.33 cm) 3 cm mowing height and 7 days interval. Lower mowing height produces shorter root length and growth, as the shoot of the grasses are removed during mowing to compensate that loss grass diverts it carbohydrates reserve to shoots, to increase the no. of shoots at cost of root growth (Christians, 2004) [3]. Similar findings of higher root length at higher mowing height is in close conformity with the findings of Sangma *et al.* (2015) and Christians, (2004) [3] and smaller root length at lower mowing height, was in agreement with Turgeon, (1980) [15].

**Table 3:** Root length (cm)

| Root length (cm) | |
|---|---|
| **Treatments** | **Treatments Mean** |
| Mowing height | |
| H1 | 235.17 |
| H2 | 241.71 |
| H3 | 242.01 |
| SE(m) | 0.26 |
| CD | NS |
| Mowing interval | |
| I1 | 25.00 |
| I2 | 27.00 |
| I3 | 27.87 |
| SE(m) | 0.26 |
| CD | 0.77 |
| Interaction | |
| H1I1 | 24.33 |
| H1I2 | 26.75 |
| H1I3 | 27.31 |
| H2I1 | 25.01 |
| H2I2 | 27.25 |
| H2I3 | 28.31 |
| H3I1 | 25.67 |
| H3I2 | 27.00 |
| H3I3 | 28.00 |
| SE(m) | 0.45 |
| CD | NS |

Root dry weight in the present finding was noted to be less than 1.00 gram in Cynadon dactylon, Similar reports were observed by Sangma *et al.* (2015) and Wherley *et al.* (2009) [16]. The maximum root dry weight (0.20 g/ 100 $cm^2$) was reported at 9 cm mowing height and 15 days mowing interval and the least was found in (0.04 g/ 100 $cm^2$) at 3cm mowing height and 7days interval. Decrease in root dry weight with lower mowing height and closer mowing interval was observed in this investigation, which was in close agreement with the findings of Sangma *et al.* (2015), Ntoulas *et al.* (2011) [10] and Murdoch *et al.* (2007) [9] in weeping grass. As frequent mowing removes photosynthetically active leaves which leads to depletion of carbohydrates reserve ultimately decrease in root dry weight.

**Table 4:** Root dry weight (g/ 100 $cm^2$)

| **Root dry weight (g/ 100 $cm^2$)** | |
|---|---|
| **Treatments** | **Treatments Mean** |
| Mowing height | |
| H1 | 0.095 |
| H2 | 0.105 |
| H3 | 0.110 |
| SE(m) | 0.002 |
| CD | 0.005 |
| Mowing interval | |
| I1 | 25.00 |
| I2 | 27.00 |
| I3 | 27.87 |
| SE(m) | 0.002 |
| CD | 0.005 |
| Interaction | |
| H1I1 | 0.04 |
| H1I2 | 0.15 |
| H1I3 | 0.19 |
| H2I1 | 0.05 |
| H2I2 | 0.16 |
| H2I3 | 0.20 |
| H3I1 | 0.05 |
| H3I2 | 0.17 |
| H3I3 | 0.20 |
| SE(m) | 0.003 |
| CD | NS |

The highest clipping yield was noted when the grasses was mowed at 3cm mowing height and 7 days interval (5.89 g/ 100 $cm^2$, whereas the least clipping yield was recorded in (3.92 g/ 100 $cm^2$) 9cm mowing height and 15 days interval. With lower mowing height and closer interval of mowing, the frequency or the no. of mowing increases so, more removal of clipping yield. Increase in shoot density at lower mowing height and lower interval increases the clipping yield. Similar results were noted by Sangma *et al.* (2015), Marcholine *et al.* (2014) [8], Ntoulas *et al.* (2011) [10], Kopec *et al.* (2007) [6] in Paspalum and Grossi *et al.* (2004) [4] in tall fescue.

**Table 5:** Clipping Yield (g/ 100 $cm^2$)

| Clipping yield (g/ 100 $cm^2$) | |
|---|---|
| **Treatments** | **Treatments Mean** |
| Mowing height | |
| H1 | 4.94 |
| H2 | 4.54 |
| H3 | 5.16 |
| SE(m) | 0.05 |
| CD | 0.14 |
| Mowing interval | |
| I1 | 5.17 |
| I2 | 4.59 |
| I3 | 4.35 |
| SE(m) | 0.05 |
| CD | 0.14 |
| Interaction | |
| H1I1 | 5.89 |
| H1I2 | 3.99 |
| H1I3 | 4.83 |
| H2I1 | 4.10 |
| H2I2 | 4.97 |
| H2I3 | 4.30 |
| H3I1 | 5.51 |
| H3I2 | 4.80 |
| H3I3 | 3.92 |
| SE(m) | 0.08 |
| CD | 0.24 |

*C. dactylon ×C. transvaalensis* 'Tifdwarf' reported the highest total chlorophyll content at lower mowing heights and closer mowing interval i.e. in 3 cm mowing height at 7 days interval with higher mowing frequency. Grasses mowed at lower intervals are found to have more greener leaves which affect the total chlorophyll content. Similar findings were reported by Sangma *et al.* (2015).

**Table 6:** Total Chlorophyll content (mg/ g fresh weight)

| Total Chlorophyll content (mg/ g fresh weight) | |
|---|---|
| **Treatments** | **Treatments Mean** |
| Mowing height | |
| H1 | 3.24 |
| H2 | 2.92 |
| H3 | 2.94 |
| SE(m) | 0.03 |
| CD | 0.09 |
| Mowing interval | |
| I1 | 3.06 |
| I2 | 3.01 |
| I3 | 2.93 |
| SE(m) | 0.03 |
| CD | 0.09 |
| Interaction | |
| H1I1 | 3.32 |
| H1I2 | 3.15 |
| H1I3 | 3.18 |
| H2I1 | 2.89 |
| H2I2 | 2.95 |
| H2I3 | 2.83 |
| H3I1 | 2.96 |
| H3I2 | 2.92 |
| H3I3 | 2.78 |
| SE(m) | 0.05 |
| CD | NS |

## Conclusion

*C. dactylon ×C. transvaalensis* 'Tifdwarf' performs better with lower mowing height and closer mowing interval.

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