



## STANDING CROP BIOMASS AND PRIMARY PRODUCTIVITY OF *GUIZOTIA ABYSSINICA L* AT AURANGABAD DISTRICT.

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### ABSTRACT:

The present paper deals with standing crop biomass and primary productivity in different plant compartments was found to be variable with the age of the crop. The total plant biomass of ageing plant indicated a sigmoidal curve in three varieties of *G. villosa* -1, *G. villosula* -2 and *G. jacksonii*-3. The total plant biomass was recorded to be 115.53 g/m<sup>2</sup> (*G. villosa* -1), 92.85 g/m<sup>2</sup> (*G. villosula* -2) and 72.42 g/m<sup>2</sup> (*G. jacksonii*-3) at final harvest i.e. 105 days. Contribution of stem and leaves to the total plant biomass has increased between 15 and 90 days. Infl./pod biomass per cent as found to be increasing throughout. Standing dead biomass was maximum 9.40 per cent (*G. villosa* -1), 8.97 per cent (*G. villosula* -2) and 6.53 per cent (*G. jacksonii*-3) at final harvest i.e. 105 days. Peak values for current increments in biomass were observed at 90 days in *G. villosa* -1 and 105 days in *G. villosula* -2 and *Jacksonii*-3. The peak values for net primary productivity were found to be highest at 90 days for *G. villosa* -1 and 105 days harvest for *G. villosula* -2 and *G. jacksonii*-3.

### KEYWORDS:

*GUIZOTIA ABYSSINICA L*, CROP BIOMASS AND PRIMARY PRODUCTIVITY.

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### INTRODUCTION

70 Niger is native to old world tropics, and is extensively cultivated in dry areas in India, Australia, Myanmar, Sri Lanka and Himalayas. It is one of the rich source proteins to the common man. It is also grown to provide feed and fodder for cattle and horses. Niger possesses medicinal properties also. Plant is an annual herb, slender, with slightly twining branches, semi-erect, low growing habit 30-50 cm high. Pods are short, 3-5 cm long, linear, with secured beak and 5-7 seeds. Seeds are flattened, rhomboidal 3-6 mm long, light red brown, black or mottled. In India, it occupies 1.88 million ha with a production of 0.89 million tones. It is extensively grown in dry areas of Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, Gujarat; in northern parts, it is cultivated in Madhya Pradesh, Himachal Pradesh and foot-hills of Uttar Pradesh, West Bengal, Bihar and Assam hills. Niger is extensively used in south India as feed for cattle and horses in the same ways as other pulses are used in north India. The seeds are cooked before feeding. Stems, leaves and split husk are also used as cattle feed. Niger is a valuable protein supplement to bulky straw fodders. The declining diversity in crop species contributing to the world's food supplies has been considered a potential threat to food security. and this dependency on few crops for ensuring food and nutritional security has been challenged with a greater need for diversification as potential future crops ( ). Keeping in view the importance of crop in the area, the present study is done to know the

standing biomass and primary productivity of Niger.

### MATERIAL AND METHODS

The study area was confined to Aurangabad is in the South Bihar Plains, on the alluvial plain of the Adri River. The Sone River is 20 kilometers to the west, and the Chhotanagpur Granitic Gneissic Complex of Jharkhand is to the south.

### STANDING CROP BIOMASS

The first sampling of different varieties of Niger i.e., *G. villosa* -1, *G. villosula* -2 and *G. jacksonii*-3 was done after 15 days of the emergence of seeding. Samplings were taken at the interval between 15 days of two successive samplings. At each sampling date five plants were selected randomly and were dug out individually up to a depth of 30 cm. Monoliths of the sampled plants were washed carefully to remove soil from the root system. Sampled plants were cut out 0 to separate their component parts. Plants were dried in oven at 80 C for 48 hours. The dried samples were weighed. The average dry weight of five plants was 2 estimated and biomass was expressed in g/m. The standard deviation was calculated for all the mean value.

### NET PRIMARY PRODUCTIVITY

The rate of dry matter production by green plants is termed as "gross primary productivity" and the rate of storage of organic matter in the body of producer

organisms, i.e. green plants, in excess of respiratory break down of potential chemical energy is known as "net primary productivity" ( ).

### IT WAS CALCULATED BY USING THE FOLLOWING FORMULA:

$W_2 - W_1 / t - t_2$  NPP (g/m<sup>2</sup>/day) = Where, W and W are standing crop 1 2 biomass at time t and t<sub>2</sub>, respectively.

### RESULTS AND DISCUSSION

**Standing Crop Biomass** The standing crop biomass of three varieties of Kulthi such as *G. villosa* -1, *G. villosula* -2 and *G. Jacksonii*-3 was studied and biomass values are shown in . Total plant biomass of variety *G. villosa* -1, *G. villosula* -2 and *G. Jacksonii*-3 grown in almost uniform cultural conditions was estimated at 15 days interval for 105 days.

The mean total biomass at 15 days of 2 growth was found to be 0.19 g/m<sup>2</sup> which increased gradually upto 2 115.33 g/m<sup>2</sup> at 105 days. The biomass accumulation at 15 days age interval in different parts of Niger variety *G. villosa* -1 is given in Table 1. Similarly, *G. villosula* -2 mean total biomass at 15 days of growth was 2 found to be 0.13 g/m<sup>2</sup> which increased 2 gradually upto 92.85 g/m<sup>2</sup> at 105 days. Table 1 further, indicates that the mean total biomass at 15 days of 2 growth was found to be 0.10 g/m<sup>2</sup> which increased gradually up to 72.42 2 g/m<sup>2</sup> at 105 days in *G. Jacksonii*-3. In total, it was found that the dry weight 2 has increased upto 566.20 g/m<sup>2</sup> (*G. Jacksonii*-1), 455.78 g/m<sup>2</sup> (*G. villosula* -2) 2 and 354.97 g/m<sup>2</sup> (*G. Jacksonii*-3) between 15 and 105 days of growth.

**TABLE: TOTAL PLANT BIOMASS, MEAN AND CURRENT INCREMENT IN BIOMASS OF DIFFERENT VARIETIES OF NIGER**

Age (Days)	Total Biomass (g/m <sup>2</sup> )			Mean increment in biomass (g/m <sup>2</sup> /day)			Current increment in biomass (g/m <sup>2</sup> /day)		
	<i>G. Jacksonii</i> -1	<i>G. villosula</i> -2	<i>G. Jacksonii</i> -3	<i>G. Jacksonii</i> -1	<i>G. villosula</i> -2	<i>G. Jacksonii</i> -3	<i>G. Jacksonii</i> -1	<i>G. villosula</i> -2	<i>G. Jacksonii</i> -3
15	0.19	0.13	0.17	0.14	0.14	0.14	0.13	0.14	0.16
30	1.32	1.11	1.34	1.34	1.22	1.32	1.32	1.22	1.22
45	5.89	5.47	5.44	5.56	5.87	5.89	5.89	5.89	5.89
60	26.911	26.11	26.91	26.67	26.91	26.911	26.911	26.911	26.911
75	51.51	51.41	51.52	51.43	51.53	51.51	51.51	51.51	51.51
90	92.51	82.51	72.53	82.23	82.21	72.51	82.51	92.51	82.51
103	115.53	105.43	113.43	113.33	113.23	115.53	114.53	113.53	115.53

The increase in biomass is attributed to the accumulation of photosynthetic this is in consonance with the study of Devi, 2016. The decrease in biomass of stem, leaf, root is attributed to senescence. The total stem, leaf and root plant biomass of aging plants indicate a sigmoid curve in all the three varieties. In annuals the growth has been reported to be sig moidal (Nath, 1990). Although all the three varieties were grown in almost uniform cultural conditions the inter varietals differences in the biomass accumulation appears to be genetically controlled

### CONCLUSION

The above studies concluded that the *G. villosa* -1 variety of Niger is ecologically suitable for cultivation in the vicinity of the agro climatic condition of Aurangabad Bihar.

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