x A.F. showing high heterosis for yield and its components and comparatively low inbreeding depression may be utilized for improvement of yield through selection in advanced generation.

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STUDIES ON REGROWTH RATE IN RELATION TO FODDER YIELD IN CUMBU-NAPIER HYBRIDS

P.RAMASAMY[1], SUKANYA SUBRAMANIAN[2], N.SIVASAMY[3] and K.BALAKRISHNAN[4]

ABSTRACT

Field experiments conducted at the Millet Breeding Station, Tamil Nadu Agricultural University, Coimbatore during 1987 and 1988 with cumbu napier hybrids revealed that none of the hybrids tested was superior to Co-1. The yield components such as-tiller number and regrowth rate decreased towards the maturity of the crop. The regrowth rate and tiller number observed were not related to yield. Competition for nutrients and change in the microclimate may be the possible reasons for such a relationship.

KEY WORDS : Cumbu-Napier (CN), Regrowth rate, Green fodder yield

Cumbu-Napier hybrid, one of the principal fodder crops, holds considerable promise for cultivation in arid regions. Earlier work on cumbu-napier hybrids mainly concentrated on the fertilizer management and cutting interval on the forage yield (Mwakha, 1972). However studies on the regrowth rates in relation to the cuttings on the green fodder yield is limited. A simple means of comparing the regrowth rate with reference to green fodder yield is reported.

MATERIALS AND METHODS

Eleven perennial fodder hybrids viz., CN-2, CN-3, CN-6, CN-7, CN-8, CN-13, CN-18, CN-19, CN-24, CN-28 and Co. 1 were raised with an espacement of 50 x 50 cm and basal fertilizer dose of 50:50:40 NPK kg ha^{-1} in a factorial randomized block design replicated thrice at new area of Millet Breeding Station, Coimbatore. Harvesting was done at 60 days interval with a subsequent top dressing of N @ 100 kg ha^{-1}. Eight harvests were made. Observations on plant height (main tiller with panicle), number of tillers $clump^{-1}$, and green fodder yield were recorded from five randomly selected plants in each replication in each treatment. The regrowth rate was worked out as per Sheehy *et al* (1979).

1 & 4 - Assistant Professors, Agricultural Botany, Agricultural College & Research Instt., Killikulam, Vallanad
2 - Professor & Head, Agricultural Botany, Agricultural College & Research Instt., Madurai - 625 104.
3 - Associate Professor, School of Genetics, TamilNadu Agricultural University, Coimbatore. - 641 003.

'able 1. Influence of cuttings on plant height (cm)

S.No.	Hybrids	Cuttings								
		1	2	3	4	5	6	7	8	Mean
1.	CN-2	200.1	157.6	198.5	177.7	151.7	139.1	225.1	238.5	186.0
2.	CN-3	193.7	162.6	206.9	172.3	161.2	160.2	224.4	218.6	187.8
3.	CN-6	210.0	177.1	184.2	208.2	199.5	132.5	239.6	234.7	199.8
4.	CN-7	207.3	185.8	212.0	229.0	226.9	185.8	245.9	258.9	219.0
5.	CN-8	205.0	168.2	158.9	207.6	222.0	173.7	252.2	224.4	201.6
6.	CN-13	205.6	187.5	226.9	216.1	239.3	185.0	234.9	225.1	215.2
7.	CN-18	163.3	147.8	183.0	182.4	168.4	133.3	205.7	214.2	174.8
8.	CN-19	192.2	143.6	192.2	178.5	169.5	131.6	207.7	229.3	181.0
9.	CN-24	201.1	170.1	180.5	209.3	159.9	143.2	216.6	215.6	187.0
10.	CN-28	201.6	153.8	185.3	225.6	168.6	134.8	216.3	197.7	185.5
11.	Co.1	204.0	151.5	186.9	198.1	172.6	121.1	206.5	201.5	180.3
Mean		198.5	164.2	193.2	200.5	186.0	149.4	225.1	223.5	

	Hybrids	Cuttings	Hybrid x Cutting
CD ($P \leq 0.05$)	12.6**	10.8**	35.7*

** Significant at 1 per cent level
* Significant at 5 per cent level

RESULTS AND DISCUSSION

Among the hybrids CN-6, CN-7, CN-8 and CN-13, recorded high plant growth compared to Co.1, the predominantly cultivated hybrid in Tamil Nadu. The hybrids CN-8 and CN-13 recorded high values for plant height in seventh cuttings, whereas CN-7 recorded high plant height in eighth cutting (Table 1). The hybrids which recorded high plant height produced more number of tillers also viz., 27.5 for CN-7, 25.1 for CN-8 and 25.5 for CN-13. Others were on par with Co.1. The number of tillers showed an unequal bimodel nature with an escalation upto three cuttings and a decline during fourth cutting and an increase thereafter (upto seventh cutting), again with a reduction during the eight cutting. Hybrids CN-7 and CN-13 performed better than Co.1 in most of

Table 2. Influence of cuttings on number of tillers/clump

S.No.	Hybrids	Cuttings								
		1	2	3	4	5	6	7	8	Mean
1.	CN-2	18.5	28.0	31.7	25.3	25.1	20.6	26.9	17.5	24.2
2.	CN-3	14.6	16.2	18.1	15.4	20.3	16.1	19.6	20.1	17.6
3.	CN-6	19.4	23.3	23.4	21.2	24.1	24.2	29.6	20.7	23.2
4.	CN-7	24.6	31.6	29.2	26.6	23.9	33.7	24.5	26.1	27.5
5.	CN-8	20.9	34.5	33.8	22.6	21.6	19.3	26.6	21.7	25.1
6.	CN-13	20.6	29.3	27.1	25.2	24.6	29.1	27.8	20.5	25.5
7.	CN-18	17.2	22.9	16.1	14.1	18.5	25.3	20.9	16.8	19.0
8.	CN-19	17.8	18.7	20.7	18.2	25.5	22.0	24.5	17.8	20.7
9.	CN-24	17.7	20.3	17.2	15.1	20.9	23.3	24.3	18.1	19.6
10.	CN-28	19.5	24.1	20.5	14.5	16.4	18.9	21.3	18.7	19.2
11.	Co.1	16.1	17.1	14.9	13.9	18.5	16.7	17.7	12.1	15.9
Mean		18.8	24.2	23.0	19.3	21.8	22.7	24.0	19.1	

	Hybrids	Cuttings	Hybrid x Cutting
CD ($P \leq 0.05$)	0.3**	2.7**	9.1**

** Significant at 1 per cent level

Table 3. Influence of cuttings on green fodder yield (t/ha)

S.No.	Hybrids	Cuttings								
		1	2	3	4	5	6	7	8	Mean
1.	CN-2	53.0	77.4	52.1	54.8	46.6	36.3	34.3	30.9	48.2
2.	CN-3	48.1	65.0	41.6	37.3	29.9	26.6	16.9	23.9	36.2
3.	CN-6	52.9	56.1	53.4	47.0	41.4	26.5	21.5	36.9	42.0
4.	CN-7	71.2	78.5	60.7	76.8	69.4	43.9	43.9	42.8	60.9
5.	CN-8	61.3	70.5	68.2	50.5	59.9	44.9	38.1	34.9	53.6
6.	CN-13	64.4	71.3	61.4	65.7	68.8	47.6	37.7	40.2	57.1
7.	CN-18	33.9	63.0	42.6	42.5	38.6	27.9	27.5	26.0	57.8
8.	CN-19	52.1	60.1	46.2	48.0	39.2	26.9	27.7	24.9	40.6
9.	CN-24	47.8	79.5	52.2	45.3	33.1	18.5	18.5	30.7	37.0
10.	CN-28	56.8	48.6	51.9	44.7	36.4	20.2	19.6	31.1	38.7
11.	Co.1	66.1	63.2	50.6	48.7	43.9	41.1	37.6	35.3	48.3
Mean		55.2	63.9	52.8	51.0	46.1	32.8	29.4	32.5	

	Hybrids	Cuttings	Hybrid x Cutting
CD (P ≤ 0.05)	13.6**	11.6**	38.4**

** Significant at 1 per cent level

the cuttings (Table 2). A comparison of the hybrids for green fodder yield brought out the superiority of CN-7, CN-8 and CN-13 and were comparable with Co.1. In general, the green fodder yield showed a diminishing trend with the progressive increase in the number of cuttings. None of the hybrids was superior to the hybrid Co.1 at any stage of the cuttings (Tabl3 3). Similar trend was noticed for the regrowth rate (Table 4).

The hybrids CN-7 and CN-13 showed high regenerative capacity at different cuttings as measured by the yard stick of the number of tillers. The rate of green fodder production is a function of tiller production and leaf growth (Ryle, 1970). But, in the present study such an association was not reflected in terms of yield, compared to hybrid Co.1. Regrowth rate as an ability of the sward to regenerate new photosynthetic

Table 4. Influence of cuttings on regrowth rate (gm/day)

S.No.	Hybrids	Cuttings							
		1-2	2-3	3-4	4-5	5-6	6-1	7-8	Mean
1.	CN-2	32.3	21.7	22.8	19.4	15.1	14.3	12.9	19.8
2.	CN-3	27.1	17.3	15.6	12.5	11.1	7.0	9.9	14.4
3.	CN-6	23.4	22.3	19.6	17.2	11.0	9.0	15.3	16.8
4.	CN-7	32.7	25.3	32.0	29.0	18.3	18.3	17.8	24.8
5.	CN-8	29.4	28.5	21.1	25.0	18.7	15.9	14.6	21.9
6.	CN-13	29.7	25.6	27.4	28.5	19.9	15.7	16.8	23.4
7.	CN-18	26.3	17.8	17.7	16.1	11.7	11.5	10.8	16.0
8.	CN-19	25.1	19.3	20.0	16.3	11.2	11.5	10.4	16.3
9.	CN-24	20.6	21.7	18.9	13.8	7.7	7.7	12.8	14.7
10.	CN-28	20.2	21.7	18.6	15.2	8.4	8.1	13.0	15.0
11.	Co.1	20.1	19.1	16.6	17.9	9.3	9.2	10.7	14.7
Mean		26.1	21.8	20.9	19.2	12.9	11.7	13.2	

	Hybrids	Cuttings	Hybrid x Cutting
CD (P ≤ 0.05)	13.6**	11.6**	38.4**

** Significant at 1 per cent level
* Significant at 5 per cent level

tissues was high in the earlier cuttings and low in the latter cuttings which may be due to the maximum meristematic activity and efficient translocation of the photosynthates to the growing apex (Kamidi and Wanjala, 1988). It is possible that heavy tillering would lead to competition for light and nutrients. This is conjuction with the building up to adverse microclimate would have reduced the photosynthesis in those hybrids, which showed promise over Co.1, as evidenced by the increased height growth, but at the cost of carbohydrate accumulation, thereby reducing the yield. However, in the present study no attempt was made to measure the photosynthesis and leaf orientation. Though Co.1 possessed minimum tillers, an increased in plant height coupled with high leaf activity would be the possible reason for the yield enhancement.

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INFLUENCE OF BLUE-GREEN ALGAE AND CERTAIN ORGANIC AMENDMENTS ON THE DEGRADATION IN SUBMERGED SOILS

P. DORAISAMY

r-HCH hen applied to blue green algae - (BGA) soil water system was found distributed more in the water than in soil and algae. Though degradation of r-HCH was observed in soil, water and BGA, still a considerable part of the initial residues remained even after 70 days. Among the organic amendments, sewage sludge was the most effective in helping the degradation of r-HCH and it was highly degraded within 5 weeks of time. The r-HCH persisted in greater quantities even after 5th week in soil with BGA.

HCH is known to persist for a longer period in soil. Biodegradation of HCH is greater in submerged soil and under anaerobic conditions (Mac Rae *et al.*, 1967). Surface application of r-HCH at low or normal rates to water logged rice soil appeared to affect only the diatom population while at higher rates affect the nitrogen fixing BGA (Ishizawa and Matsuguchi, 1966). The insecticide was found to selectively stimulate the indigenous soil BGA (Raghu and MacRae, 1967). A knowledge of its effect on the nitrogen fixing BGA and its degradation in out conditions will be of great importance and the present paper deals with the degradation of r-HCH in soils as influenced by BGA and certain organic amendments.

MATERIALS AND METHODS

Twenty gm of black soil taken in a 250 ml Erlenmeyer flask was flooded with 40 ml of distilled water to simulate the oxidised surface layer of a flooded soil as described by Gowda *et al* (1977). To the soil r-HCH was added @ 5 ppm and the treatments were replicated twice. BGA was added at 0.5 to 0.75 g wet weight and incubated at room temperature. The residues in the BGA, soil and water samples were analysed at weekly intervals following the method of Wood (1960). In another incubation study 20 gm black soil taken in test-tube was added with r-HCH @ ppm. The soil was flooded and amended with dried leaf litter, sewage sludge