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Impact of fertilizer, spacing and genotypes on yield, income and related traits in little millet

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Abstract
There were three little millet genotypes, DHLM-36-3, TNAU-63 and DHLM-21-2 evaluated in different levels of fertilizer and spacing. The results of the experiments showed that DHLM-36-3 (3631 kg/ha) produced grain yield significantly superior over than TNAU-63 (3380 kg/ha) and DHLM-21-2 (3153 kg/ha). These genotypes recorded maximum yield at 22.5 x 10 cm spacing (3657 kg/ha) which was statistically superior 30 x 10 cm spacing (3118 kg/ha). These genotypes recorded maximum grain yield at 22.5 x 10 cm spacing (3657 kg/ha) which was statistically superior over 30 x 10 cm spacing (3118 kg/ha). These little millet genotypes gave the highest grain yield when applied two hundred per cent RDF (3727 kg/ha) as compared to 150 per cent RDF (3373 kg/ha) and 100 per cent RDF (3063 kg/ha). Look into different eighteen factorial combinations, DHLM-36-3, TNAU-63 and DHLM-21-2 recorded highest fodder yield of 8360 kg/ha, 8100 kg/ha and 7150 kg/ha, respectively at 22.50 x10 cm spacing and 200% RDF (60:30:30:: N:P:K).

Keywords: hernia, buffalo bull, umbilical, herniorrhaphy

Introduction
Among the millets, little millet is one known by many regional names *viz*., *Kutki*, *Gundli* (Hindi), Suan (Oriya), *Saame* or *Saave* (Kannada), *Sumai* (Tamil) in different parts of the country. Cultivation of little millet is mostly confined to hilly tract and poor tribal communities of the country. It is also cultivated in plains by non-tribal farmers in southern states in India. The major little millet growing states are Orissa, Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh. In India it is cultivated over an area of 2.34 lakh ha with total production about 1.27 lakh tones and productivity of 544 kg/ha during 2015-16. Poor soil fertility and erratic rains are the most important constraints to crop production in the rainfed ecosystem. Soil fertility management particularly nitrogen, potassium and phosphorus plays a major role in increasing production and productivity of little millet. Nitrogen is an essential nutrient and key limiting factor in crop production. It is one of the most important plant nutrients for growth and development of crop plant. It also plays an important role in synthesis of chlorophyll and amino acids that contribute to photosynthesis for better growth and protein metabolism in plants. Phosphorus plays a big role in the development of roots. If proper development of roots then the plant takes water and nutrients from soil. Another essential macro-nutrient is potassium. Potassium required for proper plant growth. It involved a large number of physiological processes like osmo-regulation cat-ion and an-ion balance, protein synthesis and cultivation of enzymes. Farmers are under confusion as to which spacing they have to follow, whether 22.5 cm or 30 cm in northern Karnataka.

Material and Method
A field experiment was conducted during Kharif 2017 and 2018 at ARS Hanumanamatti and Kharif 2018 at MARS, UAS Dharwad of zone -8 in Karnataka, India on red soil and black soil, respectively. The soil type of the experimental site was red sandy loam in texture, which is deep and possesses good drainage at ARS Hanumanamatti. At Dharwad experiment conducted in black shallow soil with good drainage facilities. The field was prepared by repeated ploughing and harrowing. The FYM was applied 5 t/ha to all treatments on 15 days prior to sowing. The field experiment was laid out in Randomized complete Block Design, in factorial concept consisting of 18 treatment combinations. The little millet genotypes *viz*., TNAU-63, DHLM-36-3 and DHLM-21-2 was sown at 22.5 X 10 cm and 30 X 10 cm spacing with three fertilizer levels (100%, 150% and 200% of RDF) and seed rate of 5 kg/ha. The full dose of NPK as per recommended to 150% and 200% RDF.

All agronomic practices are followed as per package of practices of UAS Dharwad. The experimental data was subjected to analysis by using Fischer's method of analysis of variance (ANOVA) as outlined by Gomez and Gomez (1984) all the data were analysed and the results are presented and discussed at a probability level of 0.05 per cent.

Suitable little millet genotype and efficient and balanced fertilizer management and accurate spacing plays an important role in increasing crop yield through efficient utilization of moisture and nutrients. Therefore an attempt was made to assess performance of little millet genotypes and influence of nitrogen, phosphorus and potassium levels and suitable spacing on grain and fodder yield, gross and net returns and B:C. An experiment was conducted at Agricultural Research Station Hanumanamatti, and Main Agricultural Research station, Dharwad in University of Agriculture Sciences, Dharwad. A field trial was conducted to standardize row spacing and fertilizer level by using suitable little millet genotypes *viz*., TNAU-63, DHLM-36-3 and DHLM-21-20. The genotypes were evaluated in two different spacing *viz*., 22.50 X 10 cm and 30 X 10 cm and three fertilizer levels *viz*, 100%, 150% and 200% RDF. Experiment was laid out in factorial Randomized complete Block Design with three replications.

Table 1: Response of Little Millet genotypes to different spacing and fertilizer levels (Hanumanamatti 2017-18)

Treatments	Grain yield (kg/ha)	Fodder yield (t/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
Genotypes (G)					
G1 TNAU-63	3353	6710	65389	50442	4.37
G2 DHLM-36-3	3604	7070	70279	55332	4.69
G3 DHLM-21-2	3098	6200	60418	45471	4.04
S.Em±	80	130	1228	1228	0.085
CD at 5%	229	370	3530	3530	0.244
Spacing (S)					
S1 (22.5 cm)	3631	7170	70800	55853	4.73
S2 (30 cm)	3073	6150	59924	44977	4
S.Em±	65	120	1003	1003	0.07
CD at 5%	187	310	2882	2882	0.2
Fertilizer levels (F)					
F1 (100% RDF) (30:15:15)	3009	6020	58673	44323	4.09
F2 (150% RDF (45:22.5:22.5)	3347	6640	65258	50388	4.37
F3 (200% RDF) (60:30:30)	3700	7320	72154	56534	4.62
S.Em±	80	130	1228	1228	0.09
CD at 5%	229	370	3530	3530	0.24

Table 2: Response of Little Millet genotypes to different spacing and fertilizer levels

Treatments	Grain yield (kg/ha)	Fodder yield (t/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
G1S1F1 TNAU-63	3313	6630	64610	50260	4.5
G1S1F2	3770	7540	73522	58651	4.84
G1S1F3	3147	7500	63485	48547	4.01
G1S2F1	2619	5240	51071	36720	3.56
G1S2F2	3016	6030	58812	43942	3.95
G1S2F3	3274	6550	63843	48223	4.09
G2S1F1 DHLM-36-3	3412	6820	66534	52184	4.64
G2S1F2	3313	6630	64604	49733	4.34
G2S1F3	4364	8230	85105	69484	5.45
G2S2F1	3010	7360	58923	43853	3.85
G2S2F2	2936	5870	57252	42902	3.99
G2S2F3	3750	8250	73125	57505	4.68
G3S1F1 DHLM-21-2	3016	6030	58812	44462	4.1
G3S1F2	3254	6510	63453	48583	4.27
G3S1F3	3571	7140	69635	54014	4.46
G3S2F1	2757	5510	53762	39411	3.75
G3S2F2	2877	5750	56102	41231	3.77
G3S2F3	3115	6230	60743	45122	3.89
S.Em±	195	320	3009	3009	0.21
CD at 5%	589	980	8647	8647	0.6

Table 3: Response of Little Millet genotypes to different spacing and fertilizer levels (Hanumanamatti 2018-19)

Treatments	Grain yield (kg/ha)	Fodder yield (t/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
Genotypes (G)					
G1 TNAU-63	3241	6240	63192	47395	3.99
G2 DHLM-36-3	3491	6720	68082	52285	4.3
G3 DHLM-21-2	2986	5730	58221	42424	3.68
S.Em±	63	120	1228	1228	0.08
CD at 5%	181	340	3530	3530	0.23
Spacing (S)					
S1 (22.5 cm)	3518	6780	68603	52806	4.33
S2 (30 cm)	2960	5680	57727	41930	3.65
S.Em±	51	100	1003	1003	0.065
CD at 5%	148	290	2882	2882	0.188
Fertilizer levels (F)					
F1 (100% RDF) (30:15:15)	2896	5550	56476	41276	3.72
F2 (150% RDF (45:22.5:22.5)	3234	6230	63061	47341	4
F3 (200% RDF) (60:30:30)	3588	6910	69957	53487	4.25
S.Em±	63	120	1228	1228	0.08
CD at 5%	181	340	3529.93	3529.93	0.23

Table 4: Response of Little Millet genotypes to different spacing and fertilizer levels

Treatments	Grain yield (kg/ha)	Fodder yield (t/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
G1S1F1 TNAU-63	3201	6160	62413	47213	4.11
G1S1F2	3658	7070	71325	55604	4.54
G1S1F3	3795	7070	74260	57789	4.71
G1S2F1	2506	4770	48874	33673	3.22
G1S2F2	2903	5570	56615	40895	3.6
G1S2F3	3161	6080	61646	45176	3.74
G2S1F1 DHLM-36-3	3299	6360	64337	49137	4.23
G2S1F2	3736	7230	72859	57138	4.63
G2S1F3	4252	8130	82908	66437	5.03
G2S2F1	2823	5410	55055	39855	3.62
G2S2F2	3200	6160	62407	46686	3.97
G2S2F3	3637	7790	70928	54458	4.31
G3S1F1 DHLM-21-2	2903	5570	56615	41415	3.72
G3S1F2	3141	6040	61256	45536	3.9
G3S1F3	3458	6680	67438	50967	4.09
G3S2F1	2644	5050	51565	36364	3.39
G3S2F2	2764	5290	53905	38184	3.43
G3S2F3	3002	5760	58546	42075	3.55
S.Em±	154.28	310	3008.51	3008.51	0.1
CD at 5%	443.41	NS	8646.53	8646.53	0.31

Table 5: Response of Little Millet genotypes to different spacing and fertilizer levels (Dharwad 2018-19)

Treatments	Grain yield (kg/ha)	Fodder yield (t/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
Genotypes (G)					
G1 TNAU-63	3546	7080	53188	37391	3.36
G2 DHLM-36-3	3797	7540	56953	41156	3.6
G3 DHLM-21-2	3375	6860	50618	34821	3.2
S.Em±	73	7	544.3	544.3	0.03
CD at 5%	210	21	1564	1564	0.1
Spacing (S)					
S1 (22.5 cm)	3823	7570	57350	41553	3.62
S2 (30 cm)	3321	6760	49822	34025	3.15
S.Em±	60	6	444.4	444.4	0.03
CD at 5%	171	17	1277	1277	0.08
Fertilizer levels (F)					
F1 (100% RDF) (30:15:15)	3885	6680	49726	34076	3.24
F2 (150% RDF (45:22.5:22.5)	3539	7070	53088	37367	3.38
F3 (200% RDF) (60:30:30)	3893	7730	58934	41923	3.55
S.Em±	73	7	544.3	544.3	0.3
CD at 5%	210	21	1564	1564	0.1

Table 6: Response of Little Millet genotypes to different spacing and fertilizer levels

Treatments	Grain yield (kg/ha)	Fodder yield (t/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
G1S1F1 TNAU-63	3506	7130	52590	37390	3.46
G1S1F2	3963	7790	59438	43717	3.78
G1S1F3	4042	8250	64521	48052	3.9
G1S2F1	2812	5740	42180	26980	2.77
G1S2F2	3209	6530	48128	32407	3.06
G1S2F3	3467	7050	51998	35527	3.16
G2S1F1 DHLM-36-3	3605	7320	54075	38875	3.56
G2S1F2	4042	7700	60623	44902	3.86
G2S1F3	4557	8730	68355	51885	4.15
G2S2F1	3129	6370	46935	31735	3.09
G2S2F2	3506	7130	52590	36870	3.35
G2S2F3	3942	8000	59138	42667	3.59
G3S1F1 DHLM-21-2	3208	6530	48120	32920	3.17
G3S1F2	3447	7010	51698	35977	3.29
G3S1F3	3764	7640	56460	39990	3.43
G3S2F1	3451	7020	51758	36557	3.4
G3S2F2	3070	6250	46050	30330	2.93
G3S2F3	3308	6730	49620	33150	3.01
S.Em±	179	180	1333	1333	0.08
CD at 5%	514	NS	3832	3832	0.24

Table 7: Response of Little Millet genotypes to different spacing and fertilizer levels (Pooled for three years)

Treatments	Grain yield (kg/ha)	Fodder yield (t/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
Genotypes (G)					
G1 TNAU-63	3380	6680	60589	45076	3.91
G2 DHLM-36-3	3631	7110	65105	49591	4.2
G3 DHLM-21-2	3153	6260	56419	40905	3.64
S.Em±	59.86	100	919.6	919.6	0.035
CD at 5%	172	287	2643	2643	0.099
Spacing (S)					
S1 (22.5 cm)	3657	7170	65584	50071	4.23
S2 (30 cm)	3118	6190	55824	40310	3.6
S.Em±	48.88	81	750.9	750.9	0.028
CD at 5%	140.5	234	2158	2158	0.081
Fertilizer levels (F)					
F1 (100% RDF) (30:15:15)	3063	6080	54809	39892	3.68
F2 (150% RDF (45:22.5:22.5)	3373	6640	60469	45032	3.92
F3 (200% RDF) (60:30:30)	3727	7320	66835	50648	4.14
S.Em±	59.86	100	919.6	919.6	0.035
CD at 5%	172	287	2643	2643	0.099

Table 8: Response of Little Millet genotypes to different spacing and fertilizer levels (Pooled)

Treatments	Grain yield (kg/ha)	Fodder yield (t/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C
G1S1F1 TNAU-63	3340	6640	59871	44954	4.02
G1S1F2	3797	7470	68095	52658	4.39
G1S1F3	2864	8100	56880	40410	4.21
G1S2F1	2646	5250	47375	32458	3.18
G1S2F2	3043	6040	54518	39081	3.54
G1S2F3	3301	6560	59162	42975	3.66
G2S1F1 DHLM-36-3	3439	6840	61649	46732	4.14
G2S1F2	3876	7430	69512	54075	4.28
G2S1F3	4391	8360	78789	62602	4.88
G2S2F1	2963	5880	53081	38164	3.52
G2S2F2	3340	6640	59867	44430	3.77
G2S2F3	3777	7510	67730	51543	4.19
G3S1F1 DHLM-21-2	3042	6040	54516	39599	3.66
G3S1F2	3281	6520	58802	43365	3.82
G3S1F3	3598	7150	64511	48324	3.99
G3S2F1	2951	5860	52361	37444	3.51
G3S2F2	2904	5770	52019	36582	3.38
G3S2F3	3142	6240	56303	40116	3.48
S.Em±	146.6	244	2253	2253	0.09
CD at 5%	421.4	703	6474	6474	0.21

Results and Discussion

(Grain)

The little millet genotypes *viz*., DHLM-36-3, TNAU-63 and DHLM-21-2 tested in different levels of Nitrogen, phosphorus and potash and different spacing 22.50 x 10 and 30 x 10 cm during 2017-18 at ARS Hanumanamatti and results were presented in table 1 and 2. Out of these, DHLM-36-3 produced the highest grain yield (3604 kg/ha) which was statistically superior over TNAU-63 (3353 kg/ha) and DHLM-21-2 (3098 kg/ha). 22.5 x 10 cm spacing (3631 kg/ha) produced grain yield significantly more than 30 x 10 cm spacing (3073 kg/ha). Two hundred per cent RDF (3700 kg/ha) recorded statistically superior over 150% RDF (3347 kg/ha) and 100% RDF (3009 kg/ha) for grain yield.

DHLM-36-3 and DHLM-21-2 produced highest grain yield of 4364 kg/ha and 3571 kg/ha, respectively at 22.50 x10 cm spacing and 200 per cent RDF (60:30:30:: N:P:K) but TNAU-63 gave maximum yield of 3770 kg/ ha in 150 per cent RDF (45:22.5:22.5) and 22.50 x 10 cm spacing.

Same little millet experiment was repeated at Hanumanamatti during 2018-19 and results were summarised in Table 3 and 4. Out of three genotypes, DHLM-36-3 (3491 kg/ha) exhibited significantly superior performance over TNAU-63 (3241 kg/ha) and DHLM-21-2 (2986 kg/ha) for grain yield. When looking into spacing, 22.5 x 10 cm (3518 kg/ha) recorded more grain yield as compared to 30 x 10 cm (2960 kg/ha). 200 per cent RDF (3588 kg/ha) was significantly superior over 150% RDF (3234 kg/ha) and 100% RDF (2896 kg/ha) for grain yield.

DHLM-36-3 (4252 kg/ha), TNAU-63 (3795 kg/ha) and DHLM-21-2 (3458 kg/ha) recorded maximum grain yield in 22.5 X10 cm spacing with 200 per cent RDF (60:30:30:: N:P:K) as compared to other combinations in different factorial combinations.

The little millet genotypes *viz*., DHLM-36-3, TNAU-63 and DHLM-21-2 tested in different levels of Nitrogen, phosphorus and potash and different spacing 22.50 x 10 and 30 x 10 cm during 2018-19 at MARS Dharwad and results were presented in table 5 and 6. Out of these, DHLM-36-3 (3604 kg/ha) recorded significantly higher grain yield than TNAU-63 (3353 kg/ha) and DHLM-21-2 (3098 kg/ha) while these genotypes recorded maximum grain yield at 22.5 x 10 cm spacing (3631 kg/ha) than 30 x 10 cm spacing (3073 kg/ha). Two hundred per cent RDF (3700 kg/ha) expressed statistically superior over 150% RDF (3347 kg/ha) and 100% RDF (3009 kg/ha) for grain yield.

DHLM-36-3 and DHLM-21-2 produced highest grain yield of 4364 kg/ha and 3571 kg/ha, respectively at 22.50 x10 cm spacing and 200 per cent RDF (60:30:30:: N:P:K) but TNAU-63 gave maximum grain yield of 3770 q/ha at 150 per cent RDF (45:22.5:22.5) and 22.50 x 10 cm spacing

The pooled results of Hanumanamatti 2017-18 and 2018-19 and Dharwad 2018-19 were summarized in table7 and 8. Out of these, DHLM-36-3 (3631 kg/ha) produced the highest grain yield which was significantly superior over TNAU-63 (3380 kg/ha) and DHLM-21-2 (3153 kg/ha). These genotypes recorded maximum grain yield at 22.5 x 10 cm spacing (3657 kg/ha) which was statistically superior over 30 x 10 cm spacing (3118 kg/ha). These little millet genotypes gave the highest grain yield when applied two hundred per cent RDF (3727 kg/ha) as compared to 150 per cent RDF (3373 kg/ha) and 100 per cent RDF (3063 kg/ha).

Looking into factorial combinations, DHLM-36-3 and DHLM-21-2 produced higher grain yield of 4391 kg/ha and 3598 kg/ha, respectively at 22.50 x10 cm spacing with 200% RDF (60:30:30:: N:P:K) while, TNAU-63 recorded maximum grain yield (3797 kg/ha) in the situation of 22.50 x 10 cm spacing and 150 per cent RDF (45:22.5:22.5) Hassan *et al.* (2013) which was they got more grain yield (1.77 /ha) when applied higher dose of fertilizer $N_{30}P_{24}K_{15}$ as compared to normal (0.86 / ha) in little millet. Charate *et al.* (2017) [4] they found more grain yield of little millet in 40:20:20 as compared to 20:00:00 N: P: K. Similar results were observed by Andrew Kipkurui Korir (2019) and John W. Mc Arthur *et al.* (2017) [10]. Charles F. Yanoah *et al.* (2002) [6] Application of 30 kg/ha increases grain yield 1.2 t/ha in pearl millet. Danish Ahmed Siddiqui *et al.* (2020) [3] differential levels of fertilizer and row spacing affect yield of brown top millet. Nandini and Sridhar (2019) [7] 20 X 10 cm recorded significantly more grain yield as compared to 30 X 10 cm, 20 X5 cm and 10 X5 cm spacing in foxtail millet. M. Roja *et al.* (2020) [8] reported finger millet responded to fertilizer application from 90:40:25 to 100: 50:50 kg/ ha N_2 P_2 O_5 and K_2O while foxtail millet responded from 30: 15:15 to 50: 30:20 kg/ ha N_2 P_2 O_5 and K_2O.

Fodder yield

Little millet trial was conducted at Hanumanamatti during 2017-18 and results were presented in Table 1 and 2. Recorded highest fodder yield was found in DHLM-36-3 (7070 kg/ha) which was statistically superior over TNAU-63 (6710 kg/ha) and DHLM-21-2 (6200 kg/ha). When look into spacing, 22.5 X 10 cm (7170 kg/ha) produced more fodder yield statistically than 30 X 10 cm spacing (6150 kg/ha). Two hundred per cent RDF (7320 kg/ha) recorded significantly superior over 100 per cent RDF (6020 kg/ha) and 150 per cent RDF (6640 kg/ha) for fodder yield.

On comparison of different factorial combinations, DHLM-36-3 and DHLM-21-2 gave highest fodder yield of 8250 kg/ha and 7140 kg/ha, respectively at 30 X10 cm spacing with 200% RDF but TNAU-63 (7540 kg/ha) recorded highest fodder yield in the condition of 22.5 X 10 cm spacing with 150% RDF.

Same experiment was repeated at Hanumanamatti during 2018-19 and results have been summarised in table 3 and 4. Look into fodder yield, DHLM-36-3 (6720 kg/ha) exhibited significantly superior over TNAU-63 (6240 kg/ha) and DHLM-21-2 (5730 kg/ha).Fodder yield maximum observed at 22.5 x 10 cm spacing (6780 kg/ha) than 30 x10 cm spacing (5680 kg/ha) while out of three fertilizer levels, two hundred per cent RDF (6910 kg/ha) recorded significantly superior when compare to 150% RDF (6230 kg/ha) and 100% RDF (5550 kg/ha) for fodder yield.

On comparison of different eighteen factorial combinations, DHLM-36-3,TNAU-63 and DHLM-21-2 produced higher fodder yield of 8130 kg/ha, 7070 kg/ha and 6680 kg/ha, respectively at spacing 22.50 x10 cm with 200% RDF (60:30:30::N:P:K).

Little millet genotypes were evaluated at Dharwad during 2018-19 and results were presented in table 5 & 6. Among three little millet genotypes, DHLM-36-3 recorded highest fodder yield (7540 kg/ha) as well as it was significantly superior over TNAU-63 (7080 kg/ha) and DHLM-21-2 (6860 kg/ha). These genotypes exhibited maximum fodder yield at 22.50 x 10 cm spacing (7570 kg/ha) which was statistically superior over 30 x 10 cm spacing (6760 kg/ha). Two hundred percent RDF (7730 kg/ha) exhibited significantly superior over 150% RDF (7070 kg/ha) and 100% RDF (6680 kg/ha).

Look into eighteen different factorial combinations, DHLM-36-3,TNAU-63 and DHLM-21-2 produced higher fodder yield of 8730 kg/ha, 8250kg/ha and 7640 kg/ha, respectively at 22.50 x10 cm spacing with 200% RDF (60:30:30::N:P:K).
Pooled analysis of experiments at Hanumanamatti during 2017-18 and 2018-19 and Dharwad 2018-19 and results were depicted in table 7 and 8. Out of eighteen different factorial combinations, little millet genotype, DHLM-36-3, TNAU-63 and DHLM-21-2 produced highest fodder yield of 8730 kg/ha, 8250 kg/ha and 7640 kg/ha, respectively, at 22.50 x10 cm spacing with 200 percent RDF (60:30:30:: N:P:K).
DHLM-36-3 (7110 kg/ha) produced the highest fodder yield which was statistically superior over TNAU-63 (6680 kg/ha) and DHLM-21-2 (6260 kg/ha). Out of two spacing, these little millet genotypes exhibited maximum fodder yield at 22.5 x 10 cm (7170 kg/ha) and it exhibited significantly superior over 30 x 10 cm (6190 kg/ha) spacing. Two hundred per cent RDF (7320 kg/ha) recorded significantly superior over 150% RDF (6640 kg/ha) and 100% RDF (6080 kg/ha).
Look into different eighteen factorial combinations, DHLM-36-3, TNAU-63 and DHLM-21-2 recorded highest fodder yield of 8360 kg/ha, 8100 kg/ha and 7150 kg/ha respectively at 22.50 x10 cm spacing and 200% RDF (60:30:30:: N:P:K). Nandini and Sridhar (2019) [7] observed that 20 X 10 cm recorded significantly more straw yield as compared to 30 X 10 cm, 20 X5 cm and 10 X5 cm spacing in foxtail millet.
Danish Ahmed Siddique *et al.* (2020) [3] they reported that differential levels of fertilizers and row spacing affects fodder yield in brown top millet (*Bracheria ramose* L.) in Entisols of Baster Platue zone of Chhattisgarh. M. Roja *et al.* (2020) [8] observed that increase fodder yield by increase fertilizer levels from 75% to 125% in finger millet (responded and gave 100:50:50 gave more fodder yield as compared 90:40:25) and foxtail millet (responded and gave 50:30:20 gave more fodder yield as compared 30:15:15).

Gross returns and net returns

The trial was conducted at Hanumanamatti during 2017-18 and results were presented table 1 and 2. The DHLM-36-3 recorded highest gross and net returns (Rs 70279 and Rs 55332) which were statistically superior over TNAU-63 (Rs 65389 and Rs 50442) and DHLM-21-2 (Rs 60418 and Rs 45471).
The spacing, 22.5 X 10 (70800 and 55853) exhibited significantly superior over 30 X10 cm (Rs 59924 Rs 44977). Two hundred per cent RDF (Rs 72154 and Rs 56534) recorded statistically more gross and net returns 150% RDF (Rs 65258 Rs 50388) and 100% RDF (Rs 58673 Rs 44323).
Same experiment repeated at Hanumanamatti during 2018-19 and results were depicted in table 3 and 4. The DHLM-36-3 (Rs 70279 and 55332) recorded statistically more gross and net returns than TNAU-63 (Rs 63192 and Rs 47395) and DHLM-21-2 (Rs 58221 and Rs 48484). The spacing 22.5 X 10 (58903 and 52806) also expressed significantly more gross and net returns when compared to 30 X 10 cm spacing (Rs 57787 and Rs 41930). Two hundred per cent RDF (Rs 69957 Rs 53487) recorded statistically superior over 150% RDF (Rs 56476 and Rs 41276) and 100% RDF (Rs 63061 and Rs 47341) for gross and net returns. DHLM-36-3 (Rs82908 and Rs 66437) exhibited maximum gross and net returns at 22.5 X 10 cm with two hundred per cent RDF.
Same little millet genotypes were evaluated at different spacing and different levels of fertilizers at Dharwad during 2018-19 and results were summarised in table 5 and 6. The DHLM-36-3 (Rs 56953 and 41156) showed statistically more gross and net returns than TNAU-63 (Rs 53188 and Rs 37391) and DHLM-21-2 (Rs 50618 and Rs 34821). 22.5 X 10 spacing (Rs 57350 and 41553) exhibited significantly superior over 30 X 10 cm (Rs 49822 and Rs 34025) for gross and net returns. Two hundred per cent RDF (Rs 58394 and Rs 41923) expressed gross and net returns significantly superior over 150% RDF (Rs 53088, and Rs 37367) and 100% RDF (Rs 49276 Rs and 34076). DHLM-36-3 (Rs 68355 and Rs 51885) exhibited maximum gross and net returns in 22.5 X 10 cm and two hundred per cent RDF.
Pooled analysed results of Hanumanamatti during 2017-18 and 2018-19 and Dharwad during 2018-19 and results were presented in table 7 and 8. The DHLM-36-3 recorded highest gross and net returns (Rs 65105 and Rs 49591) which were significantly superior over TNAU-63 (Rs 60589 and Rs 45076) and DHLM-21-2 (Rs 56419 and Rs 40905). The spacing 22.5 X 30 recorded statistically more gross (Rs 65584) and net returns (Rs 50071) when compared to 30 X 10 cm (Rs 55824 Rs 40310).
Two hundred per cent RDF (Rs 66835 and Rs 50648) exhibited statistically superior over 150% RDF (Rs 60469 and Rs 45032) and 100% RDF (Rs 54809 and Rs 39892) for gross and net returns. DHLM-36-3 (Rs 78789 and Rs 62602) exhibited maximum gross and net returns at 22.5 X 10 cm with two hundred per cent RDF.

B:C ratio

Trial was conducted at Hanumanamatti during 2017-18 and results were summarised in table 1 and 2. Among three genotypes, DHLM-36-3 recorded significantly more B: C (4.69:1) ratio as compared to TNAU-63 (4.37:1) and DHLM-21-2 (4.04:1). Similarly, 22.50 x 10 cm spacing (4.73:1) expressed statistically more B: C than 30 x 10 cm (4:1). Looking into fertilizers levels, two hundred per cent RDF (4.62:1) exhibited significantly more B: C ratio than 150% RDF (4.37:1) and 100% RDF (4.09:1).
Out of eighteen different combinations, DHLM-36-3(5.45:1) and DHLM-21-2 (4.46:1) recorded the highest B: C ratio at 22.5 X 10 cm spacing with 200% recommended dose of fertilizer. Another genotype TNAU-63 (4.84:1) noticed the highest B: C ratio at 22.50 x 10 cm spacing with 150% RDF.
Same trial was repeated at Hanumanamatti during 2018-19. The B: C ratio of DHLM-36-3 (4.3:1) was statistically superior over TNAU-63 (3.99:1) and DHLM-21-2 (3.68:1). 22.5 x 10 cm spacing (4.33:1) exhibited statistically more B: C ratio than 30 x 10 cm (3.65:1). Among different fertilizer levels, 200% RDF (4.25:1) recorded maximum B: C ratio and statistically superior over 150% RDF (4:1) and 100% RDF (3.72:1).
Out of eighteen different factorial combinations, DHLM-36-3 (5.03:1) exhibited the highest B: C ratio at 22.50 X 10 cm and 200 per cent RDF.
Same little millet genotypes evaluated at Dharwad during 2018-19. Among three genotypes, DHLM-36-3 (3.60:1) recorded maximum B: C ratio and significantly superior over TNAU-63 (3.36:1) and DHLM-21-2 (3.20:1). 22.50 x 10 cm spacing (3.62:1) is significantly superior over 30 x 10 cm spacing (3.15:1) for B: C ratio. Two hundred per cent RDF exhibited statistically more B: C (3.55:1) ratio when compared to 150% RDF (3.38:1) and 100% RDF (3.24:1).
Among eighteen different factorial combinations, DHLM-36-3 (4.15:1) and TNAU-63 (3.9:1) produced the highest B: C ratio at 22.50 x 10 cm spacing with 200% RDF. DHLM-21-2

(3.78:1), recorded the highest B:C ratio at 22.5 X10 cm with 150% RDF.

Pooled analysis of Hanumanamatti during 2017-18 and 2018-19 and Dharwad during 2018-19 and results were presented in table 7 and 8.

Out of three genotypes, DHLM-36-3 (4.2:1) expressed B: C ratio significantly superior over TNAU-63 (3.91:1) and DHLM21-2 (3.64:1). The highest B:C ratio (4.23:1) was found at 22.50 x 10 cm which was statistically superior over 30 x 10 cm (3.6:1) spacing. Two hundred per cent RDF (4.14:1) was noticed significantly superior over 150% RDF (B: C (3.92:1) and 100% RDF (3.68:1). Among eighteen different factorial combinations, DHLM-36-3 (4.88:1) and DHLM-21-2 (3.99:1) recorded maximum B: C ratio at 22.50 x 10 cm spacing with 200% RDF while other genotype, TNAU-63 (4.39:1) recorded highest B; C ratio at 22.50 x 10 cm spacing with 150% RDF. B.H. Reddy *et al.* (2018) reported that RDF along with urea spray 2%, spray 2% DAP + spray 2% (CaNO3) + spray 2% (19:19:19) increase B:C (1.54:1)

Conclusion

DHLM-36-3 and DHLM-21-2 produced highest grain yield of 4391 kg/ha and 3598 kg/ha respectively at 22.50 x10 cm spacing with 200% RDF (60:30:30:: N:P:K) but TNAU-63 recorded highest grain yield (3797 kg/ha) in the situation of 22.50 x 10 cm spacing and 150 per cent RDF (45:22.5:22.5). DHLM-36-3, TNAU-63 and DHLM-21-2 recorded highest fodder yield of 8360 kg/ha, 8100 kg/ha and 7150 kg/ha, respectively at 22.50 x10 cm spacing and 200% RDF (60:30:30:: N:P:K). DHLM-36-3 (4.88:1) and DHLM-21-2 (3.99:1) recorded maximum B:C ratio at 22.50 x 10 cm spacing with 200% RDF while other two genotypes, TNAU-63(4.39:1) and DHLM-21-2 (3.99:1) recorded highest B: C ratio at 22.50 x 10 cm spacing with 150% RDF.

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