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Investigation on Ratooning Ability of Redgram (cv. Vamban 2) with Fertilizer Levels under Irrigated Condition

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A B S T R A C T

Field experiments were conducted at National Pulses Research Centre. Vamban to study the ratooning ability of redgram (cv. Vamban 2) with fertilizer levels under irrigated condition. The treatments included population dynamics viz., 60x30cm, 90x30cm, 120x30cm and 150x30cm. Different pruning height at 30,50,70cm and cutting only secondary branches and fertilizer levels viz., FRD (25:50:20:20: NPKS/ha), FRD + 25% more of the recommended dose and FRD + 50% more of the recommended dose. The results revealed that adopting a spacing of 120x30 cm recorded the yield of 933 kg/ha followed by 90x30cm, 60x30cm and 150x30cm. Among the pruning height and fertilizer levels, cutting secondary branches only, 50% more of recommended dose of fertilizers found to be superior and recorded an yield of 726 and 933 kg/ha 2015 and 2016 respectively.

Introduction

Redgram is an important pulse crop in our country. This crop is predominantly grown in tropical areas. About 90% of the world production, however, is contributed by India and production changes in this region could have a corresponding effect on the world production. The per capita availability of redgram has shown a decreasing trend in the past several years, with an obvious adverse effect on the nutritional situation in those parts of the developing world where redgram is an integral part of the daily diet. The significance of pulses, in our diet is known, but it has been neglected hither to because of its incidental failure to express its yield potential. The long duration redgram varieties like SA 1 and Vamban 2 and perennial redgram BSR 1 can be raised as inter crop and bund crop to boost productivity (Kannaiyan, 2000) Vamban 2 redgram is a new, long duration and highly resistant to sterility mosaic disease. This variety has a habitat of profuse branching (Muthiah, 2000). Hence fixing optimum plant population will be much useful to the farming community. Under rainfed situation, sterility mosaic disease resistant variety Vamban 2 can be utilised for maximum yield (Asthana and Chaturdevi, 1999). As in addition to that this variety is also performing very well under rationing, capable of yielding upto 60% of the main crop yield. Redgram also improves the physical structure of soil by enhancing water infiltration for subsequent crops and plays

crucial role in sustaining agriculture in rainfed semi-arid farming systems (Arunachalam *et al.,* 1995).

According to Savithri (2000), the analytical data of about 250000 soil samples collected from different states of the country reflected the predominantly of zinc deficiency (48.5%) followed by other.

Materials and Methods

The experiment was conducted at National Pulses Research Centre, Vamban during 2001 to 2003.

The experiment was conducted in split plot design with three replications. In the main plots, population dynamics (60x30cm, 90x30cm, 120x30cm and 150x30cm), pruning height (cutting at 30, 50, 70 cm and cutting secondary branches only) and fertilizer levels in sub plots. (Recommended dose of fertilizers, 25% more of RDF, 50% more of RDF).

The soil was red soil with sandy clay loam texture. The fertility status of the soil was 210, 9.6 and 210 kg of available N, P and K ha^{-1} respectively. The soil pH was 6.3 with the organic carbon content of 0.40 per cent.

The bio-metric observations such as plant height, days to 50% flowering, days to maturity, number of branches, number of pods/plant, number of seeds/pod, pod length and 100 seed weight and grain yield was recorded.

During the first year, this trial was carried out with the treatments i.e. population dynamics and pruning height. During the second year, the experiment was carried with population dynamics best pruning height and fertilizer levels Sowing was taken on 29 06.2001 and 02 07 2002 for 2001 and 2002, respectively.

Results and Discussion

First year (2015)

During the first year there was a rainfall of 994.7 mm received in 52 rainy days. The growth and yield attributes were recorded, statistically analysed and presented in table l and 2. The results revealed that plant height and number of secondary branches per plant, did not differ significantly due to treatments. With regard to that of yield attributes *viz.*, number of pods per plant, number of seeds per pod and seed yield, the maximum no of pods / plant was recorded (107) at 60 x 30 cm spacing. It is statistically on par with 120 x 30 cm spacing (101). The number of seeds / pod did not vary much due to varied treatments.

In addition to that days to 50% flowering is more in 150 x 30 cm spacing with a pruning height of 70cm: this is on par with 30 cm, 50 cm followed by cutting secondary branches only. Considering days to maturity of the crop it is early due to adopting a spacing of 150 x 30 cm and pruning height of 50 cm followed by 70 cm and 30 cm. The redgram pod yield (726 kg/ha) was significantly higher with a spacing of 120 x 30 cm followed by 90 x 30 cm (699 kg/ha).

The first year study revealed that adopting a spacing of 120 x 30 cm recorded significantly higher seed yield in long duration redgram (Vamban 2) than normal spacing (90 x 30 cm), closer spacing (60 x 30 cm) and wider spacing (150x30 cm).

Ratoon yield

Based on the recorded yield data, it can be concluded that adoption of 120x30 cm spacing plus pruning secondary branches only gave higher yield (320 kg/ha) followed by 90x30 cm spacing + pruning secondary branches only (290 kg/ha).

Table.1 Effect of spacing and pruning height on growth, yield parameters and yield of Redgram (Vamban 2) -2015

Treat ments	Plant height (cm)	Days to 50% flowering	Days to maturity	No. of secondary branches plant $^{-1}$	No. of pods plant $^{-1}$	No. of seeds plant $^{-1}$	Pod length (cm)	100 seed weight (g)	seed yield kg ha $^{-1}$	Ratooning yield (kg/ha)
S_1 C_1	313.7	141	180	24.0	76.6	3.4	3.5	7.2	605	241
S_1 C_2	302.4	138	177	23.8	95.2	3.3	3.6	7.1	611	252
S_1 C_3	302.8	137	175	23.0	97.0	3.4	3.6	7.5	601	245
S_1 C_4	313.4	139	175	24.6	107.4	3.2	3.5	7.2	575	270
S_2 C_1	287.6	138	178	20.4	65.8	3.2	3.6	7.3	667	228
S_2 C_2	292.5	133	174	22.2	76.8	3.3	3.6	7.0	678	232
S_2 C_3	293.2	131	173	21.6	59.4	3.3	3.4	7.4	677	206
S_2 C_4	296.7	138	179	20.3	62.6	3.4	3.6	7.6	653	290
S_3 C_1	299.9	134	174	23.6	100.6	3.3	3.7	7.9	726	231
S_3 C_2	291.8	132	172	24.9	97.0	3.3	3.6	8.0	699	218
S_3 C_3	302.3	132	172	23.6	89.2	3.3	3.6	8.2	690	221
S_3 C_4	297.2	134	174	21.6	89.7	3.4	3.6	8.2	681	320
S_4 C_1	292.5	141	181	23.8	74.2	3.3	3.6	7.2	632	231
S_4 C_2	302.5	141	182	22.1	73.6	3.3	3.5	7.3	594	235
S_4 C_3	297.8	141	181	22.2	80.4	3.3	3.5	7.2	610	213
S_4 C_4	313.0	138	178	23.5	83.2	3.4	3.5	7.9	583	278
SEd	11.8	2.7	4.1	2.2	13.5	0.04	0.1	0.6	4.6	15.0
CD (P=0.05)	NS	5.8	9.6	NS	33.0	NS	NS	NS	11.2	34.0

S_1 = 60 x 30 cm
S_2 = 90 x 30 cm
S_3 = 120 x 30 cm
S_4 = 150 x 30 cm

C_1 = Cutting at 30 cm
C_2 = Cutting at 50 cm
C_3 = Cutting at 70 cm
C_4 = Cutting secondary braches only

Table.2 Effect of spacing and pruning height on growth, yield parameters and yield of Redgram (Vamban 2) -2016

Treat ments	Plant height (cm)	Days to 50% flowering	Days to maturity	No. of secondary branches plant $^{-1}$	No. of pods plant $^{-1}$	No. of seeds plant $^{-1}$	Pod length (cm)	100 seed weight (g)	seed yield kg ha $^{-1}$	Ratooning yield (kg/ha)
S_1 F_1	259.8	34.0	137	174	205.5	3.7	3.5	7.3	698	72.3
S_1 F_2	257.0	38.0	136	177	252.1	3.7	3.6	7.5	862	70.3
S_1 F_3	289.0	39.3	135	175	265.3	4.2	3.6	7.6	916	81.7
S_2 F_1	235.7	35.6	134	174	292.7	3.5	3.5	7.3	740	71.6
S_2 F_2	296.3	44.0	133	177	277.0	3.6	3.6	7.6	881	86.3
S_2 F_3	306.6	47.2	134	175	319.6	3.6	3.6	7.8	898	86.3
S_3 F_1	272.6	45.6	133	174	258.8	3.7	3.6	7.6	867	79.0
S_3 F_2	315.8	47.8	130	175	378.8	3.6	3.6	8.0	904	90.7
S_3 F_3	326.6	54.0	135	175	399.1	3.7	3.7	7.8	933	94.0
S_4 F_1	282.4	40.1	142	182	335.1	3.7	3.6	7.6	681	79.0
S_4 F_2	265.5	43.5	143	183	264.6	3.7	3.6	8.2	783	79.7
S_4 F_3	293.4	46.0	146	189	273.9	3.9	3.6	8.2	853	85.3
SEd	13.0	3.2	2.7	2.6	36.5	0.1	0.1	0.3	46.2	4.9
CD (P=0.05)	30.8	7.2	5.8	5.5	82.9	0.3	NS	0.7	105.2	11.0

S_1 = 60 x 30 cm

S_2 = 90 x 30 cm

S_3 = 120 x 30 cm

S_4 = 150 x 30 cm

F_1 = FRD - 25:50:20 Kg NPKS/ha

F_2 = FRD + 25% more of the recommended dose

F_3 = FRD + 25% more of the recommended dose

C_4 = Cutting secondary braches only

Second year (2016)

During the second year trial the same set of spacings were adopted *i.e.*, 60x30cm (S_1), 70x30cm (S_2), 120x30 cm (S_3) and 150x30 cm (S_4). In addition to that, in the sub-plots different levels of fertilizers were tried *viz.*, full recommended dose of fertilizer (FRD — 25.50:20:20 kg NPKS / ha). FRD + 25% more of the recommended dose of fertilizer and FRD + 50% more of the recommended dose of fertilizer. Application of micronutrient (ZnSo4) @ 25 kg/ha and foliar spray of 2% DAP were common to all the treatment.

Adopting a spacing of 120x30 cm resulted in producing taller plants (326 cm) followed by 90x30cm (306 cm). Shortest plants were recorded at 60x30cm spacing (257cm). As for as the number of secondary branches are concerned, 120x30cm recorded 54 branches whereas 60x30cm recorded a minimum number of branches (34).

The days to 50% flowering and days to maturity were more with a spacing of 150x30 cm +FRD with 50% more of recommended dose of fertilizer. This is on par with FRD +25% more of recommended dose of fertilizer.

Adopting 120x30cm spacing registered more number of pods/plant (394) followed by 150x30cm spacing (335). The lowest number of pods was recorded by the treatment 60x30cm (205).

Adopting a spacing of 60x30cm recorded maximum number of seeds/pod (4.2) whereas 90x30cm spacing gave 3.5 seeds/pod.

Seed yield (933 kg/ha) was maximum with 120x30cm spacing followed by 60x30cm (910 kg/ha). The lowest seed yield (68 kg/ha) was obtained with wider spacing (150x30 cm).

Application of 50 per cent more of recommended level of NPKS recorded better growth parameters *viz.*, plant height, number of secondary branches and yield parameters *viz.*, number of pods/plant and number of seeds/pod. These have been positively correlated with seed yield. A maximum seed yield of 933 kg/ha was recorded due to application of 50 per cent more of recommended dose of fertilizer followed by application of 25 per cent more of recommended dose of fertilizer (904 kg/ha). The lowest yield (681 kg/ha) was recorded by application of recommended dose of fertilizer only.

Adopting 120 x 30 cm spacing plus 50% more of recommended dose of fertilizer recorded superior yield i.e. 933 kg/ha.

Ratoon yield

Visual observations reveal that the growth of ratoon crop was not appreciable. A seed yield of 94 kg/ha was recorded by the treatment 120x30cm spacing plus 50°/a more of recommended dose of fertilizer.

Adopting a spacing of 120x30cm. cutting secondary branches with 50% more of recommended dose of fertilizer (37.5 kg N + 75 kg P; O + 30 kg K.0 + 30 kg S) found to be superior and recorded a seed yield of 726 and 933 kg/ha for 2001 and 2002 respectively. The seed yield recorded due to ratooning was 320 and 94 kg r ha for the year 2001 and 2002 respectively

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