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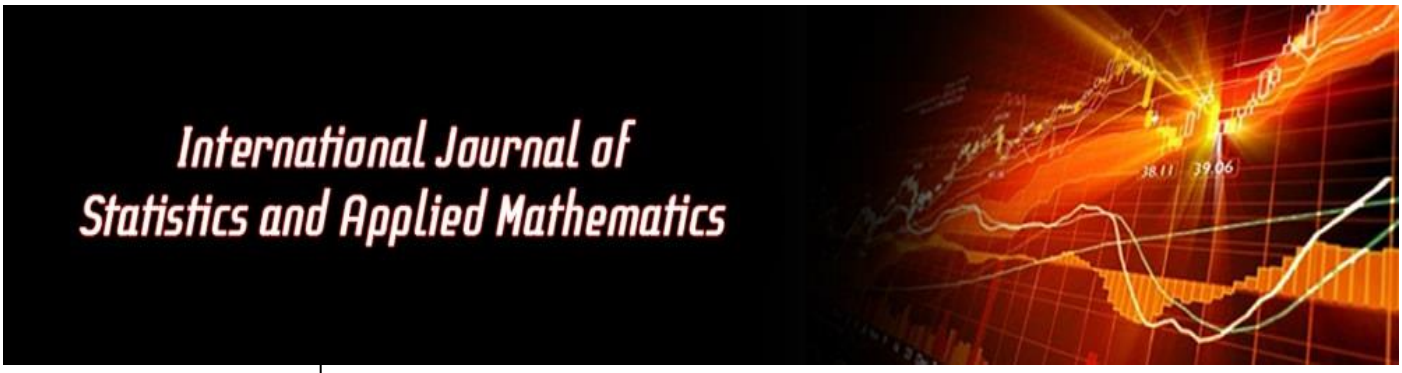

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Effect of land configuration and fertilizer on soil moisture content, yield attributes, yield economics and quality of caster

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Abstract
A field experiment was conducted during rainy (*kharif*) season of 2017-18 at Experimental Farm, Agronomy Section, College of Agriculture, Latur. The experiment was laid out in Split plot design with three replications. The tremens comprised are Main plot treatment (Land configurations): L_1- Flat bed – 90 cm × 60 cm, L_2- Ridge and furrow – 90 cm × 60 cm, L_3-Flat bed with paired row spacing – (60 -120- 60 cm) × 60 cm, L_4-BBF with paired row spacing – (60 -120- 60 cm) × 60 cm and Sub-plot treatments (Fertilizer levels) F_1-75% RDF, F_2 - 100% RDF, F_3-125% RDF. The result indicated that the land configuration treatment ridges and furrows (L_2) recorded significantly higher soil moisture content at all growth periodical days. Yield attributes *viz*. number of spikes plant^{-1}, number of capsules plant^{-1}, seed yield plant^{-1}, test weight (g), seed yield, stalk yield, biological yield, GMR, NMR and B:C ratio, oil% and oil yield were significantly highest recorded inland configuration treatment ridges and furrows (L_2) which was remained at par with treatment BBF with paired row planting (L_4) and found significantly superior over treatment flat bed (L_1) and treatment flat bed with paired row planting (L_3) at all periodical days and at harvest except 30 DAS.
Similarly Yield attributes *viz*. number of spikes plant^{-1}, number of capsules plant^{-1}, seed yield plant^{-1}, test weight (g), seed yield, stalk yield, biological yield, GMR, NMR and B:C ratio, oil % and Oil yield of castor was observed higher in application of 125% RDF treatment (F_3) and which was found significantly superior over 75% RDF treatment (F_1), and found at par with 100% RDF treatment (F_2) at all periodical days and at harvest except 30 DAS.. In case of moisture content in soil was found non-significant all periodical stages.

Keywords: Treatment, attributes, found

Introduction
Castor belongs to Euphorbiaceace family and its seed is the source of castor oil, which has a wide variety of uses. Due to erratic behavior of rainfall causes early-or late-season drought. In order to mitigate adverse effect of drought certain moisture-conservation practices are required for successful cultivation of crops under aberrant weather conditions.
The conservation of rainwater and its efficient use has been practiced in arid and semi-arid regions under dry land conditions with great success. During the rainy season, heavy downpour at short span of time leads to water stagnation which affects the spike formation and capsule development of castor, thereby proper land-configuration practices are required for easy and uniform germination as well as growth and development of plants. Land configuration is the alternation of shape of seedbed and land surface which helps in infiltration of rainfall, minimizing erosion, preventing runoff, facilitates drainage and ultimately improves water-use efficiency (Singh *et al*., 2017) [9]. Land configuration can be considered as one of the most important management practices which increases input-use efficiency and crop production but, it primarily depends on soil type and rainfall received during the cropping period (Kamble *et al.,* 2016) [5]. Fertilizers play vital role in maintaining / improving soil fertility status as the readily available nutrient to plants. Inadequate or excess supply of any plant nutrient limit may the crop production.

Among the plant nutrients, nitrogen and phosphorus are the most important and expensive nutrient and has marked effect on the plant growth in oil seed crop. Keeping these points in view, present investigation was carried out entitled "Response of castor *(Ricinus communis* L.) to fertilizer levels and plant geometry under different land configurations" was planned to find out appropriate land configuration and fertilizer dose for castor crop under dry land condition.

Materials and Methods

The experiment was conducted at during rainy (*kharif*) season of 2017-18 at Experimental Farm, Agronomy Section, College of Agriculture, Latur. The topography of experimental field was uniform and leveled. The soil of experimental site was deep, black in colour with good drainage. The chemical composition of experimental site indicated that soli was low in available nitrogen (165.00 kg ha^{-1}), medium in available phosphorus (17.50 kg ha^{-1}), very high in available potassium (464.06 kg ha^{-1}) content and alkaline in reaction having pH of 7.8. The mean annual precipitation was about 797.00 mm. most of the monsoon rains (78.54per cent) received from June to September, having 27 rainy days. Normal temperature during experimental period was min. 11.6^{0}C and max. 31.7^{0}C.The experiment was laid out in Split plot design with three replications. The tremens comprised are Main plot treatment (Land configurations): L_1- Flat bed – 90 cm × 60 cm, L_2- Ridge and furrow – 90 cm × 60 cm, L_3-Flat bed with paired row spacing – (60 -120- 60 cm) × 60 cm, L_4-BBF with paired row spacing – (60 -120- 60 cm) × 60 cm and Sub-plot treatments (Fertilizer levels) F_1-75% RDF, F_2 - 100% RDF, F_3-125% RDF. The seeds of hybrid western 6were sown at the depth of 5.0 cm. Sowing was done by dibbing 2-3 seeds per hill.

The ridge and furrow were prepared by using tractor drawn raised bed maker and flat bed were mad by bullock drawn implement manually.

The entire fertilizer applications as per the treatments in the form of urea, single super phosphate and muriate of potash was applied at the time of sowing and top dressing after 30 DAS. The fertilizers were applied in the form of a continuous band in rows and were covered with moist soil.

Results and Discussions

Land configuration

Sowing of castor on land configuration ridges and furrows treatment (L_2) recorded significantly higher soil moisture content, number of spikes $plant^{-1}$, number of capsules $plant^{-1}$ and seed yield $plant^{-1}$, test weight, seed yield $kgha^{-1}$, stalk yield $kgha^{-1}$ biological yield $kgha^{-1}$, GMR, NMR and B:C ratio, oil% and Oil yield at 60, 90,120, 150 DAS and at harvest and this treatment remained at par with treatment BBF with paired row planting (L_4)and significantly superior over treatment flat bed (L_1) flat bed with paired row planting (L_3) presented in Table 1and 2.

It might be due to overall improvement in the crop growth with the efficient utilization of available moisture which empowered the plant to manufacture more quantity of photosynthetic accumulating in the sink of the plant result in higher seed yield, biological yield. These findings are corroborative with those of Aruna and Sagar (2016) [1], Lomte *et al.* (2006) [6], and Bhople *et al*. (2018) [2].

Fertilizer levels

The yield attributing character *viz.* number of spikes $plant^{-1}$, number of capsule $plant^{-1}$, seed yield $plant^{-1}$ and seed index (g) were influenced significantly due to different fertilizer levels.

Application of 125% RDF treatment (F_3) resulted in higher number of spikes $plant^{-1}$, number of capsules $plant^{-1}$, seed yield $plant^{-1}$ (3131.28g), test weight seed yield (1473 $kgha^{-1}$), stalk yield, biological yield, GMR, NMR and B:C ratio, oil% and Oil yield of castor crop which was found at par with 100% RDF treatment (F_2) (122.97) (1263 $kgha^{-1}$) and significantly superior over 75% RDF treatment (F_1) (115.11g), (1062. $kgha^{-1}$). In relation to moisture content in soil all fertilizers dose showed non significant result at all periodical days.

The similar results were obtained by Shrivastava (1996), Aruna and Sagar (2016) [1], and Dhange (2009) [3], Ramesh *et al*. (2013) [7].

Table 1: Effect of land configurations and fertilizers levels on soil moisture content in castor grown crop

	Soil moisture content%						
(A) Land configurations (L)	**Initial**	**30**	**60**	**90**	**120**	**150**	**AH**
L_1- Flat bed 90 x 60	20.85	19.84	19.09	21.31	18.75	16.24	11.11
L_2- Ridges and furrows 90 x 60	20.05	24.91	23.50	30.25	23.44	19.66	14.98
L_3- Flat bed with paired row spacing (60 -120-60) × 60	20.93	20.35	19.39	24.52	19.73	17.68	13.06
L_4- Broad bed furrow	20.04	22.57	21.93	27.47	20.83	18.87	13.62
SE(m)±	0.54	0.63	0.66	0.48	0.52	0.66	0.52
C.D. at 5%	NS	2.19	2.28	1.67	1.81	2.29	1.81
(B) Fertilizer levels (F)							
F_1- 75% RDF	20.85	20.82	19.87	24.58	21.12	17.47	12.20
F_2- 100% RDF	20.24	21.81	21.43	25.68	19.73	18.27	12.96
F_3- 125% RDF	20.32	23.13	21.63	27.40	21.21	18.59	14.43
SE(m)±	0.57	0.61	0.51	0.74	0.51	0.47	0.42
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS
Interaction (L x F) SE(m)±	1.14	1.13	0.94	1.28	0.69	0.92	1.09
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS
General Mean	20.47	21.92	20.98	25.89	20.69	18.11	13.19

Table 2: Effect of land configurations and fertilizers levels on number of spikes plant^{-1}, capsules plant^{-1}, Seed yield plant^{-1}, test weight (g) seed yield (kgha^{-1}), stalk yield (kgha^{-1}) biological yield (kgha^{-1}), GMR, NMR, B:C ratio Oil% and Oil yield of castor crop

	Number of spikes	number of capsules	Seed yield plant^{-1} (g)	Test weight (g)	seed yield (kgha^{-1})	stalk yield (kgha^{-1})	biological yield (kgha^{-1})	GMR (Rsha^{-1})	Cost of cultivation (Rsha^{-1})	NMR (Rsha^{-1})	B:C ratio	Oil%	Oil yield (kgha^{-1})
(A) Land configurations (L)													
L_1- Flat bed 90 x 60	6.93	170.09	115.41	21.67	1047.00	1956.00	3003.00	44517	28196	16321	1.6	47.53	500.00
L_2- Ridges and furrows 90 x 60	8.87	203.78	131.52	27.22	1502.00	2697.00	4200.00	63872	29831	34040	2.1	51.17	759.00
L_3- Flat bed with paired row spacing (60 -120-60) × 60	7.07	178.18	116.88	24.22	1207.00	2269.00	3476.00	51313	28196	23117	1.8	48.55	580.00
L_4- Broad bed furrow	7.89	195.26	128.67	25.22	1308.00	2537.00	3846.00	56549	29813	26718	1.9	49.70	678.00
SE(m)±	0.30	4.21	2.85	0.70	70.70	121.30	87.00	3134	----	3134	----	0.51	49.24
C.D. at 5%	1.05	14.54	9.85	2.42	245.00	420.00	301.00	10845	----	10845	----	1.76	179
(B) Fertilizer levels (F)													
F_1- 75% RDF	6.75	173.18	115.11	21.75	1062.00	2019.00	3081.00	43393	28444	14949	1.5	46.75	499.00
F_2- 100% RDF	7.82	187.46	122.97	24.75	1263.00	2298.00	3561.00	57248	29014	28283	2.0	49.14	662.00
F_3- 125% RDF	8.35	199.83	131.28	27.25	1473.00	2777.00	4251.00	61540	29583	31957	2.1	51.82	726.00
SE(m)±	0.20	4.50	2.91	0.61	33.60	47.80	67.00	1530	----	1530	----	1.10	25.19
C.D. at 5%	0.61	13.48	8.71	1.83	101.00	143.00	201.00	4590	----	4590	----	3.30	76.00
Interaction (L x F) SE(m)±	0.42	11.55	1.61	0.84	33.600	166.90	201.00	3613	----	3613	1.85	0.75	44.23
C.D. at 5%	NS	NS	NS	NS	NS	500.00	NS	NS	----	NS	----	NS	NS
General Mean	7.64	186.83	123.12	24.58	1266.00	2365	3631	54063	----	25049	----	49.24	629.00

Interaction

Interaction of effect land configurations and fertilizer levels on stalk yield was significant. Significantly highest mean stalk yield was recorded by the interaction of treatment BBF with paired row planting (L_4) and application of treatment 125% RDF (F_3) (9473 kg ha^{-1}). The treatment land configuration ridges and furrows (L_2 recorded the highest mean stalk yield (2697 kgha^{-1}) and among the fertilizer levels 125% RDF (F_3) recorded highest stalk yield (2777 kgha^{-1}).

Interaction effect of land configurations and fertilizer levels on stalk yield

P × F	F_1	F_2	F_3	Mean
L_1	5366	5468	6768	1956
L_2	7115	8147	9013	2697
L_3	5375	6970	8074	2269
L_4	6370	6992	9473	2537
Mean	2019	2298	2777	2365

SE(m)± = 166.9C.D. at 5% =500

References

1. Aruna E, Karuna Sagar G. Productivity of Rainfed Castor as influenced by Plant Geometry and Nitrogen Levels. IRA-International Journal of Applied Sciences (ISSN 2455-4499), 2016, 4(1).
2. Bhople Kokila, Kubde KJ, Bharti Tijare, Godavari Gaikwad. Impact of land configurations and nutrient levels on growth and yield of sunflower under rainfed condition Inte. J Curr. Microbiol. App. Sci. 2018;7(1):363-368.
3. Dhange AM, Karanjikar PN, Dhamak AL, Barkule SR. Effect land configurations and phosphorous levels on the yield of niger under rainfed condition. Asian J of soil science (December 2009 to May 2010). 2009;4:328-330.
4. Guled MB, Surkod VS, Mallikarjun H. Response of pigeon pea and castor based cropping system to planting geometry and moisture conservation practices and recycling of crop residue in vertisol. Annual progress report All India Co-ordinated Research Project on dryland Agriculture, Regional research station, Bijapur. 1998, p.51-56.
5. Kamble AS, Waghmode BD, Sagvekar VV, Navhale VC. Effect of land configuration and mulching on productivity and enegery use in groundnut. Indian journal of Agronomy. 2016;64:489-498.
6. Lomte DM, Umate MG, Kausale SP, Kote GM. Effect of different land configurations on yield of soybean (*Glycine max* (L.) *Merrill* L.) Genotypes under rainfed conditions. Legume Res. 2006;29(4):295-297.
7. Ramesh P, Murty IYLN, Haripriya CV. Long term effect of nutrients on castor (*Ricinus communis* L.) productivity, soil fertility, nutrient uptake and nutrient use efficiency in rainfed Alfisol J Oilseed Res. 2013;30(1):39-42.
8. Shrivastava SK, Singh ND. Investigation on sowing time, plant spacing and fertilizer requirement on hybrid castor, (*Ricinus communis* L.) for non-traditional Utter Pradesh J Oilseeds Res. 2009;26:289-291.
9. Singh AK, Meena RN, Kumar AR, Sunil Kumar, Meena R, Singh AP. Effect of land configuration methods and sulphure levels on growth and yiled and economics of Indian Mustard under irrigated conditions. Journal of Oilseed Brassica. 2017;8:151-57.