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Research Paper

OPTIMIZATION OF NIGER (*Guizotia abyssinica* L. CASS.) PRODUCTION UNDER VARIOUS RESOURCE CONSTRAINTS

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Abstract

Niger (*Guizotia abyssinica* L. Cass.) is an important traditional minor oilseed crop of India, cultivated mainly in hilly and tribal areas. Inspite of high oil content and a wide range of adaptability, little attention has been paid towards maximization of this oilseed crop. The agronomic practices *viz.,* fertilizer, thinning, weeding and plant protection plays important role in maximizing the grain yield as yield levels in most of the crop are stagnated. Keeping in view all facts, the present research work of assessment of niger crop as influenced by various resource constraints was formulated in RBD design in three replications with 12 different treatments. The results in the present investigation revealed significant differences in respect of seed yield for all the treatments studied. Among the different treatments, highest seed yield was recorded by the treatment T_1 (291 kg/ha) with B:C ratio 2.17 followed by T5 (220 kg/ha, BC ratio: 2.34) and T_3 (284 kg/ha, BC ratio: 2.30) and lowest yield recorded by T_{12} (129 kg/ha, BC ratio: 2.26).

Key words: Niger, Production, Resource constraints.

INTRODUCTION

Niger {*Guizotia abyssinica* (L.f.) Cass.} known as Ramtil or Kalatil in India and Noog in Ethiopia is an important minor oilseeds crop of tropical and subtropical ecosystems like India and Ethiopia countries. Niger is cultivated to limited extent in India (1.8 lakh ha), South and East Africa. In India, it is mainly cultivated in tribal pockets of Orissa, Madhya Pradesh, Bihar, Maharashtra, and Karnataka while as sizeable area in certain region of Gujarat, U.P, Rajasthan and Arunachal Pradesh. In India, South Gujarat heavy rainfall zone particularly comprising of Dang, Navsari and Valsad districts are very potential areas where this crop is already being grown to some extent. Niger although considered as a minor oilseed, is very important in terms of quality and taste of its oil and export potential. This tribal crop is also withstand the adverse climatic and poor soil conditions [4]. Success of any crop production depends on use of quality seed and improved cultural practices. Maximization of seed yield of any crop will be effected due to various major agronomic practices *viz.,* recommended dose of fertilizer, thinning, weeding and plant protection [2]. The resources like agro-biological inputs, intensive cultivation practices and synthetic fertilizers are becoming costlier gradually which are unaffordable by the resource poor tribal farmers are them. Therefore, these resource poor and tribal farmer's communities demand a special attention for low-cost input sustainable technology. Popularization and integration of agro-biological inputs and intensive cultivation practices in such a way that a best alternatives will increase the profitability of niger crop in resource poor farmers with low cost

[1]. Keeping in view the above facts, the present investigation was undertaken for maximizing the niger production under resource constraints.

MATERIALS AND METHODS

The present research experiment was conducted on Niger (*Guizotia abyssinica* L.f.) cv. Gujarat Niger-1 at Niger Research Station, NAU, Vanarasi (Gujarat), India during *kharif* season of 2014-15. Based on 15 years rainfall data, the district receives 1393 mm average rains annually. Total Twelve treatments comprised as 100%RDF + Thinning + Plant Protections + Weeding (**T_1**), T_1 - 100%RDF (**T_2**), T_1 - Plant Protections (**T_3**), T_1 - Thinning (**T_4**), T_1 - Weeding (**T_5**), T_1 - 100%RDF + Plant Protections (**T_6**), T1 - 100%RDF + Thinning (**T_7**), T_1 -100%RDF + Weeding (**T_8**), T_1 - Plant Protections + Weeding (**T_9**), T_1 -100%RDF + Thinning + Plant Protections (**T_{10}**), T_1 - 100%RDF + Thinning + Weeding (**T_{11}**), T_1 - 100%RDF + Thinning + Plant Protections + Weeding (**T_{12}**), were tested in randomized block design with three replications. Niger was sown @ 5 kg seed/ha in rows 30 cm apart and 10cm plant to plant spacing. As per recommended dose (20:20:00 NPK) of the fertilizer, nitrogen was applied as urea and phosphorus as SSP. Only 50% N & 100% P was applied as basal dose. While remaining 50% N was top dressed after one month of sowing. All other treatments were imposed as per the schedule and methodologies given above to specific plots.

RESULTS AND DISCUSSION

The data presented in table 1 revealed that the seed yield (kg/ha) was highest (291 kg) in the full package treatment (100%RDF + Thinning + Plant Protections + Weeding) as compare to all other treatments. The treatments T_3 (T_1 - Plant Protections) and T_4 (T_1 - Thinning) were recorded 284 and 267 kg seed yield per ha which was at par with the treatment T_1 (Full package practice). However, none of the treatment was at par with both of the above treatments. The other treatments *viz.,*T_2, T_5, T_6, T_7 and T_9 were at par with each other suggesting that these treatments were not make any significant changes in seed yield (kg/ha) in niger. The minimum seed yield (129 kg/ha) was noticed in the treatment T_{12} as the treatment was devoid of any improved cultivation practices and no any improved agronomical or biological inputs also [5].

The tribal farmer's communities are unable to afford costly agro inputs to grow the niger crop. Hence the present investigation was aimed to minimized the expensive cultivation practices and find out the most appropriate treatment combination. The economic status of each treatment was determined by considering the cost of inputs used and gross returns (Table 1). In niger crop, only grain yield have good market value. But large quantity of straw produced by the crop almost negligible value which is used only as fine fuel for cocking of food and or to some extent thatching material. Therefore, enough scope to decompose it as compost manure and prepare the candy cake for use as fuel. The treatment T_1 which includes all the improved cultivation practices recorded highest gross monetary returns (GMR Rs. 17454 ha^{-1}) followed by T_3 (Rs. 17060) and T_4 (Rs. 16042) which suggest increase in GMR due to integration of all resources used during cultivation whereas increase in net monetary return (NMR) is due to increase in GMR [3 & 1]. Benefit cost ratio refers to monetary gain over each rupee of investment under the particular treatment. The treatment T_5 (T_1 - Weeding) was recorded maximum profitability (2.34) followed by T_3 (T_1 - Plant protection/2.30), T_4 (T_1 - Thinning/2.30) and T_{11} (2.29) respectively. These results are in conformity with findings of Yadav *et al.* and Sharma and Kewat [6 & 7]. Thus it was revealed from the present investigation that integration of proper treatment combinations will definitely increased the seed yield (kg/ha) and profitability of niger crop with reducing costly cultivation practices.

Table 1: Optimization of Niger production under resource constraints during *Kharif*, 2014-15.

Sr. no	Treatment	Plant height	Capsules/ Plant	Seeds/ Capsules	1000 seed wt.	Seed yield (Kg/ha)	Cost of cultivations (Rs./ha)	Gross monetary returns (Kg/ha)	Net returns (Kg/ha)	B:C ratio
1	T_1=FT+TH+PP+WD	132	20.08	17.67	3.95	291	8050	17454	9404	2.17
2	T_2=T_1-FT	126	19.00	22.08	4.01	218	6700	13079	6379	1.95
3	T_3=T_1-PP	123	20.17	16.53	3.87	284	7425	17060	9635	2.30
4	T_4=T_1-TH	117	17.67	16.52	4.09	267	6970	16042	9072	2.30
5	T_5=T_1-WD	127	17.50	16.00	4.19	220	5650	13194	7544	2.34
6	T_6=T_1-FT+PP	125	21.00	17.35	4.17	204	6075	12245	6170	2.02
7	T_7=T_1-FT+TH	114	18.50	18.70	4.03	210	5800	12593	6793	2.17
8	T_8=T_1-FT+WD	114	19.75	20.83	3.80	176	4700	10532	5832	2.24
9	T_9=T_1-PP+WD	129	16.50	14.67	3.81	197	5425	11829	6404	2.18
10	T_{10}=T_1-FT+TH+PP	120	19.58	17.50	3.93	181	5175	10856	5681	2.10
11	T_{11}=T_1-FT+TH+WD	122	17.25	19.00	3.87	150	3925	8981	5056	2.29
12	T_{12}=T_1-FT+TH+PP+WD	128	17.00	17.33	3.95	129	3425	7755	4330	2.26
	SE (m)±					**12.50**				
	CD 5 %					**36.66**				
	CV %					**10.28**				

FT: Fertilizer, TH: Thinning, PP: Plant Protections, WD: Weeding

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