Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-6: 154-158

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-6) pp. 154-158**
Journal homepage: http://www.ijcmas.com

Original Research Article

Production Constraint Analysis of Niger (*Guizotia abyssinica* L. Cass) in Vertisol

S.K. Krishna[1], V.P. Suryavanshi[2*] and D.B. Jadhav[1]

[1]Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India
[2]Department of Agronomy, College of Agriculture, Latur, Maharashtra, India
**Corresponding author*

Keywords

Niger, Production constraints, Fertilizers, Thinning, Weeding

A B S T R A C T

A field experiment was conducted during *kharif* season of 2016-2017 on vertisol at Agronomy section, College of Agriculture, Latur to study the production constraint analysis of niger (*Guizotia abyssinica* L. Cass) in vertisol. The topography of experimental field was uniform and leveled. Soil of the experimental site was deep black in colour with good drainage. The soil of experimental plot was clayey in texture, low in nitrogen (225.64 kg ha^{-1}), and medium in phosphorus (21.74 kg ha^{-1}) and rich in available potassium (490.36 kg ha^{-1}) and alkaline in reaction having pH 8.1. The experiment was laid out in Randomized Block Design with seven treatments, replicated thrice. The results indicated that adoption of full package of practices was recorded significantly higher growth attributes viz., number of branches (11.13), number of flower head (35.60) and dry matter accumulation per plant (20.33 g) over rest of the treatments. Highest number of seeds per plant (455), seed yield per plant (2.052 g) and seed yield (483 kg ha^{-1}), were recorded with the adoption of full package of practices closely followed by treatment where thinning is not done i.e. T_3: T_1 - Thinning. Among the various single production constraints fertilizer was found to be most crucial factor caused yield losses up to 26 % followed by weeding 25 % and thinning 7 %. Regarding the combination of two factor production constraints, fertilizer + weeding was resulted in reduction in niger yield by 45 % and found to be as a major resource constraints in niger production followed by thinning + weeding and fertilizer + thinning where yield losses were up to 39 % and 33 % respectively.

Introduction

Niger (*Guizotia abyssinica* L Cass.) is one of the important oilseed crops of India belonging to family compositae. Niger seed principally used for extraction of edible oil and contains 37 to 42% oil. The niger plant is consumed by sheep but not by cattle, to which only niger silage can be fed. It is generally used as spice in chutney, pickles and ketchup for adding taste in diet. Raw oil has low acidity and can be used directly for cooking. The niger oil is premium oil because of high linoleic acid content (45-60%). Sometimes it is used as substitute to sesame oil. The inferior quality oil is used as illuminant. Niger cake is used as manure consists of 5 % N, 2 % P_2O_5 and 1.5 % K_2O. In Maharashtra, niger seed is consumed as chutney and largely used as spices.

Success of any crop production depends on improved cultural practices. Among the major agronomic practices, recommended

dose of fertilizer, thinning, and weeding plays important role in maximizing the seed yield of niger. The different factors (fertilizer + thinning + weeding) contributes towards the establishment of the crop stand, growth of plant and ultimately the final yield of crop and known as 'resources constraints', but the relative contribution of these factors have not been quantified. A resource constraint is a limit on what can be done because of limitations on what is available to do it. While solving a problem it is important to know what constraint applies so that attempt can be made to push against that constraint to find a unique solution. Resource constraints refer to the limitations on cultural operation and basic inputs of agriculture like weeding, fertilizers and thinning that are necessary for better growth and development of crop and higher yield and economic benefits. Study on resource constraints helps farmer in dry land and rain fed farming as in limited funding which operation (constraint) is most essential in regards with optimum yield and higher maximum gross monetary returns so that farmer give priority to that particular operation. Though the input management had been given due importance, the percent contribution or the losses due to their non-availability to the niger crop are yet to be quantified. Keeping in view, the present investigation entitled 'Production constraints analysis of niger (*Guizotia abyssinica* L Cass.) in vertisol was undertaken to assess the effect of different constraints on growth and yield of niger and to quantify the losses due to different constraints.

Materials and Methods

A field experiment was conducted during *kharif* season of 2016 at Experimental Farm of Agronomy section, College of Agriculture, Latur to study the effect of production factors or constraints and their combinations on growth and yield of niger. The soil of the experimental site was medium, black in colour with good drainage. soil was low in available nitrogen (225.64 kg ha^{-1}), medium in available phosphorus (21.74 kg ha^{-1}), very high in available potassium (490.36 kg ha^{-1}) content and alkaline in reaction having p^H of 8.1. The experiment was laid out in Randomized Block Design. The seven treatments were replicated thrice. The treatments were T_1: Full package of practices, T_2: T_1 - Fertilizer, T_3: T_1 - Thinning, T_4: T_1 - Weeding, T_5: T_1 - (Fertilizer + Thinning), T_6: T_1 - (Fertilizer + Weeding), T_7: T_1 - (Thinning + Weeding). Sowing was done by dibbling by using seed rate 2.5 kg ha^{-1}. The gross and net plot size were 5.4 x 4.2 m^2 and 4.8 x 3.6 m^2 respectively. Sowing was done on 23rd June 2016.The recommended dose of fertilizer 40:20:00 kg NPK ha^{-1} was applied as per treatments through Urea and DAP. The recommended cultural practices and plant protection measures were under taken as per treatments and recommendation. Data on various variables were analyzed by analysis of variance (Panse and Sukhatme, 1967).

Results and Discussion

Growth attributes

Growth attributing characters *viz*., plant height (cm), leaf area (dm^2), number of branches, number of flower heads and dry matter accumulation (g) per plant were influenced significantly due to different treatments (Table 1).

The maximum plant height was recorded by the treatment T_7 (T_1 – thinning + weeding) where thinning and weeding were not adapted, which was at par with all the treatments except the treatments where fertilize (T_2) and fertilizer + weeding (T_6) are considered as resource constraint

treatments. These results could be attributed because of competition of the crops with the weeds for solar radiation, moisture, nutrients, and for spacing and without thinning causes the inter plant competition also responsible for higher plant height. The role of nitrogen in cell division could be responsible for the increase in plant height. Similar results were also observed by Jagtap *et al.,* (2014) and Jagtap *et al.,* (2015).

Full package treatment recorded higher value of leaf area per plant (dm^2) which was at par with the treatment where weeding is considered as resource constraint treatment (T_4) and found significantly superior over rest of the treatment. Full package of practices helped the plant to express with full potential by enhancing numbers of leaves and leaf area per plant. Similar results were identified by Vaishali *et al.,* (2013).

The adaption of full package of practices recorded significantly higher number of branches, number of flower head and dry matter accumulation per plant over rest of the treatments. This might be due to availability of nutrients, space, light, without weed competition to crop which enhanced growth and increased the dry matter accumulation per plant. Suppression of weeds resulted in good crop stand utilizing maximum crop plant nutrients and hence comparatively resulted in higher dry matter production on plant.

Dry matter accumulation per plant was drastically reduced when thinning and weeding was not given (T_7). This might be due to weeds competing with crop plants for water, space and nutrients and utilizes available resources more efficiently than crop resulted in reduction of dry matter production of plant. These results were agreed with the reason obtained by Jagtap *et al.,* (2015), Deshmukh *et al.,* (2003).

Yield attributes

The yield attributing characters of niger *viz*., seed yield per flower head (g), seed yield per plant (g), number of seeds per plant and seed yield (kg ha^{-1}) were influenced significantly due to different constraints (Table 2). The treatment of full package of practices recorded significantly higher seed yield per flower head of niger which was at par with the treatments where thinning (T_3) and weeding (T_4) are considered as resource constraints. Highest seed yield per plant (g), number of seeds per plant and seed yield (kg ha^{-1}) of niger were observed with full package of practices which was significantly superior over all the treatments, except the treatments where thinning (T_3) was done. These results could be attributed due to optimum plant population, weed free condition along with full package of practices which encouraged the plant to express with full potential. Similar result was found by Patil *et al.,* (2005).

Reduction in yield due to resource constraints

The higher seed yield (483 kg ha^{-1}) was produced with the full package of practices (T_1). Among the various single production factor constraints, fertilizer was found to be most crucial factor caused yield losses up to 26 % followed by weeding 25 % and thinning 7 %. Regarding the combination of two factor production constraints, fertilizer + weeding resulted in reduction in niger yield by 45 % as compared to full package of practices and found to be as a major resource constraints in niger production followed by thinning + weeding and fertilizer + thinning which caused yield losses upto 39 % and 33 % respectively. These results were inconformity with the results of Deshmukh *et al.,* (2003), Jagtap *et al.,* (2014).

From the results it may be inferred that adoption of full package of practice was more remunerative for getting higher growth and yield in niger. Among the various single production factor constraints, fertilizer and weeding and in combination of two factor production constraints, fertilizer + weeding, thinning + weeding and fertilizer + thinning were found to be crucial for reducing niger yield

Table.1 Effect of different treatments on growth attributing characters of niger

Treatments	Plant height at harvest (cm)	Leaf area at 75 DAS (dm^2)	No. of Branches at harvest	No. of flower head $plant^{-1}$ at harvest	Dry matter at harvest (g)
T_1 = Full Package of practices	113.47	9.72	11.13	35.60	20.33
T_2 = T_1 – Fertiliser	92.53	8.44	9.00	31.20	18.15
T_3= T_1 - Thinning	121.73	7.09	7.33	26.27	16.69
T_4 = T_1 – Weeding	110.27	8.86	7.53	25.60	18.08
T_5 = T_1 - (Fertiliser + Thinning)	114.80	7.98	7.07	27.67	14.76
T_6 = T_1 - (Fertiliser + Weeding)	103.00	6.46	6.40	28.47	15.27
T_7 = T_1 - (Thinning + Weeding)	122.47	5.95	5.53	25.13	14.17
SEm±	2.74	0.39	0.47	1.31	0.67
C. D. at 5%	8.44	1.21	1.45	4.05	2.05
General mean	**111.18**	**7.79**	**7.71**	**28.56**	**16.78**

Table.2 Effect of different treatments on yield attributing characters and yield of niger

Treatments	Seed yield per flower head (g)	Seed yield per plant (g)	No. of seed per plant	Seed yield kg/ha.	Percent reduction in yield over full package
T_1 = Full Package of practices	0.119	2.052	455	483	--
T_2 = T_1 – Fertiliser	0.106	1.417	320	353	26
T_3= T_1 - Thinning	0.117	1.876	415	452	07
T_4 = T_1 – Weeding	0.114	1.295	295	363	25
T_5 = T_1 - (Fertiliser + Thinning)	0.100	1.209	280	323	33
T_6 = T_1 - (Fertiliser + Weeding)	0.073	1.020	243	264	45
T_7 = T_1 - (Thinning + Weeding)	0.077	0.930	215	296	39
SEm±	0.003	0.123	15	20	--
C. D. at 5%	0.009	0.378	47	60	--
General mean	**0.100**	**1.400**	**318**	**362**	**--**

References

Deshmukh, M.R., Jain, H.C. and Duhoon, S.S. 2003. Optimization of niger (*Guizotia abyssinica* L Cass.) production under resource constraints at various location in india. *J. Oilseeds Res.*, 20(1): 141-143.

Jagtap, P.K. and Manharbhai, C. Patel., 2015. Optimization of niger (*Guizotia abyssinica* L Cass.) production under various resource constraints. *J. Global*

biosci., Vol. 4.

Jagtap, P.K., Sandipan, P.B. and Patel, M.C. 2014. Performance of niger as influenced by various resource constraints. *Int. J. Current Res.*, 6(8).

Panse, V. G. and Sukhatme, P. V. 1967. Statistical Methods for Agricultural Workers (1st edn.), ICAR, New Delhi.

Patil, H.S., Dhadge, S.M. and Bodake, P.S., 2005. Effect of macro and micro nutrients and organic manure on yield attributes, seed yield of niger (*Guizotia abyssinica* L Cass.) under rainfed condition in western ghat of maharastra state. *Agric.Sci.Digest*, 26(3): 233-234.

Vaishali, H.S., Patel, C.L., Patil, P.R., Pisal, R.R., Rinku Patel and Patel, D.A., 2013. Performance of Rabi niger (*Guizotia abyssinica* Cass.) influenced by phosphorus management. *Int. J. Forestry and Crop Improvement*. 4(1): 40-43.