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Adoption of recommended cultivation practices in Niger crop (*Guizotia abyssinica* (L.f.) Cass.) by tribal farmers in Agency area of Alluri Seetharama Raju district, Andhra Pradesh, India

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ABSTRACT

Niger crop is being cultivated in agency areas of ASR district, Andhra Pradesh for millennia with 4000 ha area during the year 2020-2021. The package of practices for cultivation of Niger crop is validated and proven the best as per ANGRAU recommendations. The present study reveals the information on major adopted recommended cultivation practices of Niger crops besides constraints faced by the tribal farmers. A set of 15 recommended practices were prepared as a schedule for personal interview to 60 randomly selected tribal farmers in agency areas and their responses were recorded. The results inferred that among all the schedules, majority farmers had adopted the recommended practices like sowing in time, harvesting within time, application of FYM and drying the harvested produce before bagging with 96.67, 96.67, 95.00 and 93.33 per cent responses. The major constraints include cuscuta weed management, non availability of Niger seed/improved varieties of Niger crop and difficulty in sowing due to dreadful weather conditions like continuous rains. Development of contingency crop plans or suggestive alternate crops are needed during the weather disasters. Through training programmes, method and result demonstrations information on weed, pest and disease management in Niger crop are to be disseminated to the tribal farmers. Village level seed multiplication/production technologies are to be popularised among tribal farmers to encompass the sufficient seed material with vigour and viability to sustain the Niger crop cultivation in agency areas of ASR district, Andhra Pradesh.

Key words: Niger, Cultivation practices, Tribal farmers, Adoption levels, Cuscuta, Constraints

Introduction

Niger (*Guizotia abyssinica* (L.f) Cass., Compositae) is a minor oil seed crop, well adapted to hardy, less fertile, sloppy land and being cultivated in India for millennia as a traditional inherited crop. In India, Niger is extended to an area of around 4.3 L ha⁻¹

being cultivated in the states of Andhra Pradesh, Madhya Pradesh, Orissa, Maharashtra, Bihar, Karnataka, West Bengal and Nagar Havel (Smita *et al.*, 2017). Niger oil is being used for lighting, anointing, painting, soap making and in pharmaceuticals also, besides cooking purpose. The seed cake made of Niger is being utilised by farmers as animal feed,

manure, fuel making (Birhann, 2021) and is also used in industries as an additive in biodiesel (Ramesh and Sharavanappa, 2015).

Niger seed oil is premium oil with high linoleic acid content (45-60%) and Omega 3 fatty acids which ensures balanced cholesterol level in human body and also cures asthma and regulates lung function and gastrointestinal issues. Appraising these health perspectives Niger is consumed as spice crop in many hilly and tribal areas since many years (Krishna *et. al.*, 2018).

Niger crop is being cultivated by tribal farmers in hilly areas as their traditional native crop for oil purpose with lot of devotional/inclination attachment since renaissances. Farmers raise this crop with great privilege and pride in cultivation even though they do not received economic benefits. At present in Alluri Seetharama Raju (ASR) district of Andhra Pradesh, Niger crop is being cultivated by tribal farmers in 11 agency mandals covering an area of around 4000 ha. This crop is a major tourist attraction in these tribal areas especially during November and December months and it is quite fascinating to outline that few farmers are supplicating charges from the visitors/tourists willing to take photo snap from their aesthetic valued crop during flowering season.

The standard scientific crop production and protection technologies for Niger crop were validated and also assessed by various Scientists and inferred that by adopting theses technologies the yield can be maximised with assured economic returns. The major agronomic practices *viz.*, application of recommended fertilizers dose, thinning, weeding and need based plant protection measures plays a key role in maximizing the yield (Kivadasannavar *et.al.*, 2007; Jagtap and Manharbhai, 2015).

The present study was undertaken to examine the extent of production technologies adopted by the tribal farmers in agency areas of ASR district, Andhra Pradesh to assess the technology spread. The information on adoption levels of recommended Niger cultivation practices including constraints in adoption from farmer responses in spread of technology aspects will definitely aid to formulate an assortment of extension activities to sustain the Niger crop cultivation more remunerative.

Materials and Methods

The survey was conducted in agency mandals of

ASR district, Andhra Pradesh during the year 2020-2021 by means of exploratory research design methodology. Among the 10 tribal agency mandals of ASR district comprising of around 4000 ha area of Niger, three mandals *viz.*, Araku Valley, Hukumpeta and Guden KothaVeedi had documented highest area of Niger cultivation with 2500 ha area. Hence, the present study was executed in above three mandals only and from each mandal, two villages were opted and from each opted village 10 farmers were randomly selected, so a total of 60 tribal farmers were chosen for recording their responses through personal interview. A set of 15 critical recommended Niger crop production practices from seed to storage were considered for developing an questionnaire to record farmer responses from the university recommended package of practices (Annual ANGRAU Farmer's Almanac, 2020-21). A personal interview was made for each selected farmer and their responses with regards to adoption levels of recommended crop management practices of Niger crop and constraints perceived by the farmers in Niger crop cultivation were recorded. The recorded data was subjected to suitable statistical analyses and the results were documented.

Results and Discussion

The farmer responses with respect to adoption of critical recommended practices in Niger crop cultivation and constraints in adopting were recorded and the results are discussed herewith.

Adoption of Niger crop critical recommended cultivation practices

The results from the sixty farmer's responses inferred that among the various critical Niger crop cultivation recommendations, only time of sowing (96.67%), harvesting time (96.67%), farm yard manure application (95.00%), drying of produce then bagging (93.33%) and fertilizer application (85.00%) were being adopted by the tribal farmers. The percent adoption levels were indicated in Table 1. As the tribal farmers in the agency areas of ASR district cultivate the Niger crop during late *kharif* season, majority of the farmers were sowing the crop during the months of August as per recommendation and at the same time farmers are harvesting the crop produce at right maturity stage only.

Farmers has a traditional practice of drying the produce in the field itself for sufficient drying, this is

also one of the scientific cultivation practices being adopted by farmers (93.33). Regarding fertilizer application, during the recent years, due to availability of urea, farmers were applying nitrogenous fertilizers during the vegetative phase of the crop as fertilizer application will enhance the yield (Patil, 2010). Another major occupation next to agriculture for tribal agency farmers was rearing the livestock especially the milching cattle for secondary source of income, there is an abundant availability of farm yard manure and the farmers were applying more than recommended quantity to the Niger crop.

Adoption of critical recommended practices *viz.*, inter-cultivation (20.00%), land preparation (16.67.00%), seed rate (13.33%), sieving of seed for cuscuta seed separation (6.67%) and salt water treatment for cuscuta weed management (3.33%) were adopted by very few farmers . The farmers simply

broadcast the seeds of Niger crop with high seed rate leading to dense plant population and they do not practice thinning operations which is the major reason for low yields. Inter cultivation operations are not being adopted by them which enhances the weed load in the main crop limiting the yields. Even though the cuscuta weed menace was major constraint for Niger yields the farmers are not practices the recommended management practice as suggested *i.e.*, sieving out the weed seed or removal of weed seed by salt treatment before broadcasting the Niger seed due to lack of availability of appropriate sieves and unaware of the importance of salt water treatment method in suppressing cuscuta weed in major crop.

From the responses, it was clearly evident that he critical recommended practices *viz.*, line sowing of crop, chemical weed management, pest control

Table 1. Adoption of Niger crop critical recommended practices by Tribal farmers (n=60)

S. No.	Recommended practices	Response categories			
		Adopted		Non-adopted	
		F	%	F	%
1	Time of sowing (Aug 15- Sep 15 th)	58	96.67	2	03.33
2	Variety (KGN 2; GA 10 or JNS)	6	10.00	54	90.00
3	Land preparation (2-3 times fine tilth)	10	16.67	50	83.33
4	Seed rate (5 kg / acre)	8	13.33	52	86.67
5	Salt water treatment to seed (for Cuscuta weed control)	2	3.33	58	96.67
6	Sieving of seed for Cuscuta seeds separation	4	6.67	56	93.33
7	Method of sowing (line 30 × 10 cm)	0	0.00	60	100.00
8	Manures (2.5 t FYM/acre)	57	95.00	3	05.00
9	Fertilizers (8 kg N at 15-20 DAS)	51	85.00	9	15.00
10	Inter-cultivation (two times weeding at 10 days interval after 15 DAS)	12	20.00	48	80.00
11	Weed Management (Pendimethalin 1.3 l/ac after sowing)	0	0.00	60	100.00
12	Pest management (Tobacco hairy caterpillar and sucking pests –Neem oil 5 ml/l or Chlorpyrifos 2.5 ml/l)	0	0.00	60	100.00
13	Disease management (leaf spot – Mancozeb 2.5 g/l and Powdery mildew – Dinocap 1 ml/l)	0	0.00	60	100.00
14	Harvesting (at 100-110 days)	58	96.67	2	03.33
15	Drying of produce (8-10 days) then bagging	56	93.33	4	06.67

Source: Primary survey data

Table 2. Niger crop cultivation constraints as perceived by tribal farmers (n=60)

S. No.	Constraint	Response		Rank
		F	%	
1	Difficult to control Cucuta	52	86.67	I
2	Unable to sow the crop in time due to weather conditions like continuous rains	42	70.00	III
3	Lack of improved varieties seed	46	76.67	II
4	Non-availability of seed during sowing time	32	53.33	IV

Source: Primary survey data

practices and disease management practices were not being adopted by any of the tribal farmers. Line sowing is an important agronomic recommendation which aids in maintaining proper crop stand with optimum plant population. Hence, this practice is to be popularised among the tribal farmers through training programmes, method demonstrations/result demonstrations and also through on farm trials.

The Niger growing agency area embraces the tribal farmers with no/less awareness on weed management, pest and disease control. The survey observations in Niger crop also witnessed that abiotic stresses like nutrient deficiencies or climatic factors has very less impact on Niger yields as this crop is grown and native here in ASR district agency areas for the past many years. Biotic stresses like weed, pest and disease infestations will impede the crop yields to an extent ranging from 15-55 percent and farmers simply rely on crop itself after sowing and no management practices were being adopted by them to suppress the biotic stresses.

The reason might be lack of awareness and no economical profits are being recurred from Niger cultivation and area is being declining day by day. Therefore, extension activities like training programmes, group discussions and demonstrations are to be properly planned in time and organised to the Niger growing tribal farmers in agency areas.

Constraints in Niger crop cultivation

Even though Niger crop cultivation is an age old cultivation practice in the agency area by the tribal farmers, the crop cultivation has some perceived constraints as tabulated in Table 2. The major constraints documented through farmers perceptions/views includes difficulty in controlling cuscuta weed (rank 1), lack of Niger improved varieties (rank II), unable to sow the crop in time during continuous rains (III) and non-availability of seed during sowing time (rank IV).

The tribal farmers are not practicing any control methods for cuscuta weed either cultural/mechanical or chemical. If the crop was once infested with this parasitic weed, the Niger crop losses its vigour initially and later predisposes itself to other biotic stress invasions. At this juncture, the farmers have no alternative except to leave the infested crop as it is, without harvesting. The non harvested crop will act as food source reserve and harbour for weed seed setting, pest immature stages and disease inoculums. Thereby facilitating the aggravation of

weed load inoculums, pest and disease infestation levels for the next ensuing seasons. The results are in accordance with the finding of Rick *et al.*, (2010) who witnessed that farmers had left the Niger crop without harvesting in Northern Thailand area when the crop was severely attacked by the cuscuta weed infestation.

Sometimes due to continuous rains the farmers are unable to take up the sowing operations in time and area is being vacant without any crop. Hence studies on alternative crops suited to that particular weather conditions and contingency crop plans are to be developed for sustainability in crop cultivation among farmers community.

Lack of local improved varieties and also availability of the seed for timely sowing operations are categorised as another major problems facing by farmers. Seeds from self cultivated crops are only being utilised by tribal farmers for the next years also leading to loss of seed vigour and viability. Seed material for cultivating the Niger crop in larger extent of areas is not available among farmer themselves and also unavailable in market also to purchase. Hence, seed multiplication practices at farmer levels are to be encouraged among tribal farmers to maximise Niger crop area under cultivation. Hence, training programmes at village level for seed multiplication/production activities are to be regularly organised through farmer field schools or front line demonstrations. Getinet and Sharma (1996) also pronounced that neglected crops like Niger are to be encouraged among farmers through extension activities for conserving the crop. Technology demonstrations can increase the extent of adoption of recommended cultivation practices among farmers resulting in higher yields (Aruna *et.al.*, 2018).

Conclusion

From the present investigation, it was clearly evident that the major critical cultivation practices for Niger crop is not being adopted by the tribal farmers with respect to weed, pest and disease management which are the major limiting factors for yield reduction. The non availability of improved varieties, sufficient seed for sowing in larger extent of areas and weather disasters are considered as major constraints for Niger crop cultivation. Hence, extension activities like training programmes, method and results demonstrations are to be conducted to create awareness among tribal farmers on weed,

pest and disease management. Village level seed multiplication or production is to be popularised for maintaining sufficient seed required for sowing in time in larger inclined areas. Contingency crop plans are to be designed and validated for disaster management.

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