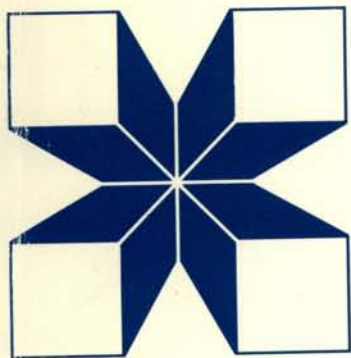


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**OIL CROPS:
PROCEEDINGS OF THE
THREE MEETINGS HELD
AT PANTNAGAR AND
HYDERABAD, INDIA,
4 - 17 JANUARY 1989**

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La présente série est réservée aux documents issus de colloques, aux rapports internes et aux documents techniques susceptibles d'être publiés plus tard dans une série de publications plus soignées. D'un tirage restreint, le rapport manuscrit est destiné à un public très spécialisé.

Esta serie incluye ponencias de reuniones, informes internos y documentos técnicos que pueden posteriormente conformar la base de una publicación formal. El informe recibe distribución limitada entre una audiencia altamente especializada.

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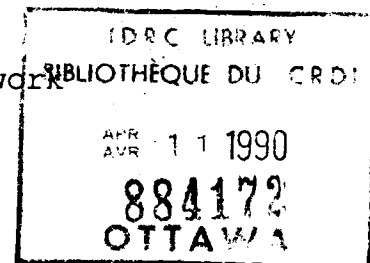
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**OIL CROPS:
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PANTNAGAR AND HYDERABAD, INDIA, 4-17 JANUARY 1989**

1. The Brassica Subnetwork-II
2. The Other Oil Crops Subnetwork-I
3. The Oil Crops Network Steering Committee-I

Edited by

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Organized by

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PRESENT PRODUCTION, RESEARCH AND FUTURE STRATEGY FOR NIGER IN MAHARASHTRA

A.V. Joshi

Abstract

In India the total oilseed area is 19 million hectares with a production of 13 million tons. The estimated demand in 2000 AD. is 26 million tones of oilseeds in India. Niger is mainly grown in India and Ethiopia. Productivity per unit area in India is 265 kg/ha and that of Ethiopia is 334 kg/ha. Maharashtra, during 1987-88 contributes for 1,21,900 hectareage with 26,200 tones of niger seed. It is grown in five zones having varied intensity of rains (500-3000 mm) and varied soil fertility, (hill tops, sub-marginal land, lower to higher fertility in plains). The yield levels are too low. Studies of production practices of the niger farmer reveals constant use of local cultivar, simply broadcasting of seed, no other interculture operation and harvest at maturity. Breeding research was initiated at Pune (1934) Nagpur (1949) and Niphad (1955). The varieties "Niger B", No. 5, and N-12-3 were released respectively, by the stations mentioned above. Generally these varieties have 10-15% more yield over the locals. In 1983, variety IGP-76 "Sahyadri" is released for commercial cultivation. The IGP-72 entry is being tried on farmers adaptive trial. The culture Phule-4, DHL-1, DN-9 are in the chain of coordinated trials in 1988-89.

As an outcome of agronomic research, line sowing at 20 cm row spacing, adopting thinning before 21 days of sowing, attending weeding 20-30 days after sowing, applying 5 tones of FYM and 20 kg N/ha are the recommendations for niger grower. The studies of niger intercropped with Bajra in 1:1 proportion, and with horse gram 2:2 proportion indicated higher monetary returns (1986-87). The future research strategy in the discipline of botany, agronomy & plant protection is discussed.

Oilseeds, occupying about 19 million hectares with an annual production of over 13 million tons, play an important role in the agricultural economy of India. The widening gap between supply and demand of oilseeds in recent years resulted in the import of oils by incurring foreign exchange of Rs. 15 billion. The thrust to increase the domestic oilseed production is receiving due to priority by farmer, researcher and policy maker. The estimated demand for consumption in 2000 A.D. by 100 million Indian population is projected to be 24-26 million tons alarming a two fold increase in the present yield of oilseed. Niger (*Guizotia abyssinica* Cass.) is mainly grown in India and Ethiopia. The area and production of niger in India is more than that in Ethiopia. The productivity per unit area in Ethiopia is 334 kg/ha and it is more than India 265 kg/ha (1981). Niger occupies fifth

position in coverage of total oilseeds in India. It contributes 79% and 75% of the area and production of the world.

Area, production and yield of niger in India is given in Table 1. The average yield of the crop is considerably lower than those of major oilseed crops. Niger is prominently grown in the Madhya Pradesh, Orissa, Maharashtra, Karnataka, Bihar and Andhra Pradesh states. The crop is being popular in some pockets of Tamil Nadu, Rajasthan, Arunachal Pradesh. Unfavourable seasonal conditions encountered in many parts of the country resulted in the decrease in area and production in 1986-87. Maharashtra state ranks third in area and fourth in production amongst niger growing states. The productivity in the state is considerably lower than the state averages of Orissa, Bihar and Andhra Pradesh.

Table 1. Niger area, production and yield in India.

State	Area '000 ha				Production ('000 tons)				Yield (q/ha)			
	1970	1980	1983	1986	1970	1980	1983	1986	1970	1980	1983	1986
All India	486.6	598.7	594.9	588.7	127.7	146.1	175.0	132.1	2.61	2.44	2.94	2.24
Maharashtra	81.9	102.0	95.1	87.3	14.0	17.9	20.3	10.8	1.71	1.75	2.13	1.23
Madhya Pradesh	238.6	224.7	219.9	220.8	44.0	32.5	47.6	32.1	1.84	1.45	2.16	1.45
Orissa	77.8	158.1	180.1	171.5	36.3	65.8	81.2	60.5	4.67	4.16	4.50	3.52
Karnataka	24.5	54.8	54.0	53.1	3.4	19.6	9.4	9.3	1.39	1.75	1.74	1.73
Bihar	51.5	47.9	37.4	36.1	22.2	17.7	14.4	13.5	4.28	3.70	3.85	3.73
Andhra Pradesh	13.9	10.6	6.8	13.5	7.8	2.5	2.0	3.7	5.61	2.36	2.99	2.74

Major districts of the state in coverage of niger area are Nasik, Osmanabad, Ratnagiri and Beed. About 60% of the total area of the state under niger falls in the following zones: 1) Ghat Zone: (3000-5000 mm rains), 2) Very high rain fall zone: (2250-3000 mm), 3) Transition "B" Zone: (700-1200 mm) 4) Assured rain fall zone: (700-900 mm) and 5) Scarcity zone: (500-700 mm) with varied altitudes 50-180 m asl.

Current yield of niger per unit area is extremely low and its cultivation is beset with variety of constraints like shattering, self incompatibility, lower priority of its cultivation, non use of high productivity and high intensity of cropping system, non adoption of improved package of practices. To overcome these constraints, it is necessary to survey niger area, socio-economic conditions of the niger grower, package of practices and the cropping system.

Production practices of niger farmer

The cultivation of niger is undertaken by tribal people as their principal means of earning money. Niger is grown for cash income, for home use as cooking, lighting and as a component of high energy diet. Niger is taken up mostly as a sole crop and in some pockets it is intercropped with finger millet, bajra and hill

millet. The studies of niger farmer of the Nasik district reveals that they have small holdings (0.4 ha to 13.2 ha) out of which 7-36% is utilized for niger cultivation. Niger-finger millet is a popular rotation. The grower receipts monetary returns of Rs. 600-3000. Regarding the disposal of Niger yields, about 70% of the produce is sold in market, 15% of the seed is used for home consumption. The farmer's just broadcast 5-15 kg/ha seed of local varieties after receipt of monsoon rains on undulating land, on slopes and tops of hills and in plains. It is grown in an adverse condition where other crops may virtually fail. The crop is subjected to various biotic and abiotic factors. No cultural operations are undertaken except sowing by broadcasting and harvest the crop at maturity.

Niger Breeding

Past research

Though niger occupied 17% of total oilseed area of the state, proper attention has not been given in the fields of agronomy, breeding, entomology and pathology. Literature indicates scanty research efforts were made mostly of academic interest. The then Department of Agriculture, Bombay state initiated research in breeding in the decade of 1930. In 1934-35 the varieties niger "A" and "B" gave 10% more yield over local.

The research efforts were concentrated at Nagpur during 1940-50. The variety No. 5 is recommended for hilly areas of Vidharbha. The breeding research executed at Niphad during 1950 helped in releasing, in 1955, N-12-3 a most popular variety of the time giving about 10% more yield over the local.

The operation of All India Co-ordinated Research Project since 1974 onwards geared the program of evolving varieties and formulating of package of practices. The variety "Sahyadri" (IGP-76) is released in 1983. It gives 31% more yield than the local cultivars. It is a national variety and under best management, it yields up to 1100 kg/ha (Table 2).

Table 2. Niger varieties released for the Maharashtra state.

Variety	Year of release	Station of release	Yield Kg/ha	Oil %	Days to maturity	Area for which released	Salient features
No. 5	1934	Nagpur	200	38	105	Vidharbha	Seeds are black and small. Sensitive to thermo-photo period.
Niger-B	1949	Pune	220	39	110	Bombay State	Medium in duration.
N-12-3	1955	Niphad	250	40	115	Bombay State	Insensitive to photo-thermo period.
Sahyadri (IGP-76)	1983	Dhule	300	40	120	Western Maharashtra and Orissa, West Bengal and Konkan	Widely adapted in the states of Maharashtra, Orissa, West Bengal and Dadra Nagar Haveli. Seeds colour.

region are small and blackish in

Present research

Breeding efforts are concentrated for evolving varieties. Proven viable technology generated for increasing the per hectare yield under different agro-ecological and crop growing situations. Systematic research approach is formulated by adopting a chain of experimentation: 1) Collection, maintenance and evolution of germplasm. 2) Population improvement program. 3) Hybridization program. 4) Preliminary yield trial. 5) Trial of promising strain. 6) Multi-location varietal trial. 7) All India co-ordinated varietal trials (initial evaluation trial, and coordinated varietal trial I and

II, in late and early groups).

At present IGP-72 culture is under evaluation on farmers' field under Adaptive/Minikit program. The strain Phule-4 is in apex testing under CVT-II. The entry DHL-1 is under the screening test at CVT-I. The entry DN-9 and DN-4 developed by the centre is included in the Initial Evaluation Trial (1987-88).

There is a great scope to study genetic variability available in indigenous/exotic cultures, genetics of self-incompatibility, development of inbreds for composite/synthetics, development of specific, special production technology capable of producing

immediate tangible results for achieving national targets of increased oilseed production by transforming the available production technology generated.

Research on Agronomy

Very little attention has been given to the research on agronomic aspects prior to the establishment of a coordinated research project. The following are the recommendations released for the farmers:

- 1) line sowing at 20 cm distance between rows in heavy rainfall zone,
- 2) one thinning before 21 days of sowing to maintain plant-to-plant distance of 10 cm,
- 3) weeding once 20-30 days after sowing,
- 4) sowing upto the first fortnight of August in heavy rainfall zone,
- 5) application of 20 kg N/ha,
- 6) application of 5 tones of FYM,
- 7) intercropping of niger with bajra (1:1) and horse gram (2:2) have given higher monetary returns (1987-87), and
- 8) in the order of importance of improved package of practices, the use of improved variety, plant protection, fertilizer and line sowing were found to be effective in niger cultivation.

Research information is yet to be worked out for cropping system, cropping sequence, relay cropping, studies on impact of improved package of practices on farmer's field.

Future Research Strategy

Low productivity and high instability are the main barriers of niger yields. The information on genetics, restructuring of plant architecture towards imparting maximum photosynthetic efficiency to improve sink capacity has to be worked out.

A) Breeding

- i) Collection evaluation, conservation of indigenous and exotic germplasm for yield, oil content and quality and adaptability.
- ii) Breeding for seed yield, fertilizer responsiveness, non-shattering, high harvest index and desirable maturity.
- iii) Study of genetic variability, information on genetic control and efficient screening method for development of population for breeding varieties by composite/synthetic.
- iv) Hybridization program to incorporate photo-thermo insensitiveness and disease and pest resistance.
- v) Estimation of genetic parameters of yield and yield contributing characters.
- vi) Convergent Improvement Program for ideotype suitable for situation asked.
- vii) Population improvement Program for improving yield.
- viii) Yield trials of promising genotypes, and
- ix) Production of pure and quality seed.

B) Agronomy

- 1) Greater priority for low input low cost technology.
- 2) Adoption of seeding time and rate for specific situation.
- 3) Working out fertilizer/plant population requirements of improved varieties.
- 4) Studies of the existing cropping system, soil erosion, weed control, fertilizer use and strip cropping.
- 5) Determination of components of yield.
- 6) Development of cultural practices for higher yield.
- 7) Demonstration of improved package of practices.
- 8) Studies of socio-economic

constraints of marginal, sub-marginal and trial farmer's.

C) Plant protection

- 1) Assessment of yield losses due to pest/diseases.
- 2) Survey of pests/diseases of niger and
- 3) Research to generate effective pest management practices.

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