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Phule Vaitarana (IGPN 8004) - An High Yielding Variety of Niger for Maharashtra State

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***Abstract* – Phule Vaitarana (IGPN 8004) Niger variety is Selection from Local line Chadrachi Met 'Trimbak' tahsil, Dist- Nashik (Maharashtra State). It has greenish purple stem colour with more oil content (35.94%) and oil yield (189.77 kg. ha^{-1}). It has early maturity(104 days) with bold seed sizes (3.8 gm/1000 seed). The variety is resistant to Cercospora leaf spot, Alternaria leaf spot and Powdery mildew diseases under field condition. In various Multilocation and All India Coordinated trials, the genotype IGPN 8004 consistently recorded best performance. Under rainfed conditions the genotype gave 485 kg.ha^{-1} seed yield which was 21.40 per cent higher than the check variety Phule Karala. Unsaturated fatty acid i.e. Linoleic acid is more in IGPN 8004 (57.2 %) than the Phule Karala (55.4). High protein content (26.0%) compare to check Phule Karala (21.43%). The variety is released and notified(2015) under the name "Phule Karala" for rainfed Kharif condition of Maharashtra State.**

Keywords – High Yield, IGPN 8004, Niger Variety, Phule Vaitarana, Rainfed.

I. Introduction

Niger (Guizotia abyssinica Cass) is an important oilseeds crop grown in Tropical and Subtropical countries like India, Ethiopia, East Africa, West Indies and Zimbabwe. However, India and Ethiopia are the two major Niger producing countries in the world. Niger, though a native of Tropical Africa, is widely spread and under extensive cultivation in India, since remote past. In India, it is mainly cultivated in the states of Madhya Pradesh, Orissa, Maharashtra, Bihar, Karnataka and Andhra Pradesh and some extent in hilly areas of Rajasthan, U.P., Gujarat and Tamil Nadu and some parts of the northeastern hilly regions.

In India it is grown on an area of 3.10 lakh ha with the production of 1.01 lakh tonnes and the productivity of 325 kg/ha (2012-13). In Maharashtra, it is grown on area of 0.374 lakh hectares with the production of 0.117 lakh metric tonnes and productivity of 312 kg/ha. (2012-13), which is higher than the national average. [1]

All India Coordinated Research Project on Niger, Igatpuri, Dist.: Nashik affiliated with Mahatma Phule Krishi Vidyapeeth, Rahuri has been concentrated to develop new varieties of Niger having high seed yield potential with high oil quality, early maturity and resistant to disease. Towards this goal, collection and evaluation of local germplasm of Niger lead to develop a new variety IGPN-8004. The IGPN-8004 was tested in multilocation trials for four years and on an average of 20 trials, It was found superior by 21.91% over Phule Karala (NC). It was also tested in 12 trials in co-ordinate programme and it gave 20% superiority over the national check IGP-76.

Looking to the superior performance of IGPN-8004, It was proposed for release for kharif rainfed condition in Maharashtra state.

II. Materials and Methods

Phule Vaitarana (IGPN 8004) Niger variety is Selection from Local line Chadrachi Met 'Trimbak' tahsil, Dist-Nashik (Maharashtra State). It was tested in Station trial along with the check Phule Karala and IGP 76 in the year (2008-09). Considering the promising performance, this genotype was promoted to multilocation trial (rainfed). For rainfed condition the genotype was tested at Igatpuri, Dhule, Nandurbar, Rahuri, Kolhapur Shirgaon, and Parbhanii during Kharif (2009-2012). Due to the superior performance under multilocation trial, the genotype was also tested in All India Coordinated Initial Varietal Traial during Kharif 2011 at 05 locations. The performance of this genotype was consistently superior over the national check IGP 76 for yield. Considering the superior performance this genotype was promoted to the All India Coordinated Advanced Varietal Trial during Kharif 2012.The performance of this genotype was consistently superior over the national check variety IGP 76 for yield as well as oil content. In Kharif 2013, it was also tested in adaptive trials at 35 farmers field along with check variety Phule Karala. It has also recorded more yield over the check. It was therefore released for commercial cultivation for Kharif season of Maharashtra State under the name "Phule Vaitarana". The statistical analysis was carried out according to Panse and Sukhatme (1967). Statistical analysis was done by the given standard procedure [2].

III. Results and Discussion

Performance of IGPN 8004 in Different Trials

In station trial conducted during 2008-09 at Igatpuri the yield differences due to genotypes were significant. The culture IGPN 8004 gave grain yield of 610 kg ha^{-1}(Table 1) which was 18.90 per cent higher than the check Phule Karala (513 kg ha^{-1}). In the multilocation trial, the culture IGPN 8004 recorded 21.91 per cent higher yield (324 kg ha^{-1}) than the check Phule Karala (316 kg ha^{-1}). In All India Coordinated initial varietal trial conducted during Kharif 2010 at 05 locations the genotype IGPN 8004 gave grain yield of 664 kg ha^{-1}.which was 26.47 per cent higher than the check IGP 76 (525 kg ha^{-1}). In advanced varietal trial conducted during Kharif 2012 at 07 locations the genotype

IGPN 8004 gave grain yield of 516 kg ha^{-1} which was 13.66 per cent higher than the check IGP 76 (454 kg ha^{-1}). During Kharif 2013, total 2935 adaptive trials were conducted at farmers field in the different districts of Maharashtra State in that the genotype IGPN 8004 recorded grain yield of 509 kg ha^{-1} Which was 22.35 per cent higher than the check variety Phule Karala (416 kg ha^{-1}).

In 33 trials conducted on research field and 35 trials conducted on farmers field during 2008 to 2013, the genotype IGPN 8004 showed superior performance and gave 485 kg ha^{-1} mean grain yield over the check variety Phule Karala (371 kg ha^{-1}) and IGP76 (346 kg ha^{-1}) which was 21.40 per cent and 26.08 per cent higher than the check varieties Phule Karala and IGP 76 (Table I).

Pest and Diseases

The screening was carried out under field conditions during 2010 and 2012. It revealed that the genotype IGPN 8004 was consistently resistant to Cercospora leaf spot, Alternaria leaf spot and Powdery mildew (Table II). Similarly, it has shown moderatly tolerant to semilooper and caterpillar (Table III).

Quality Characters

In quality studies (Table IV) IGPN 8004 recorded higher oil content (35.94 %) than the check variety Phule Karala (35.45%). In oil quality parameters (Table V), essential unsaturated fatty acid i.e. Linoleic acid (57.2%) was more in Phule Vaitarana than Phule Vaitarana (55.4). Protein content was also observed high in IGPN 8004 (26.00%) than the check varieties Phule Karala (21.43%) and IGP 76 (23.37%).

It had a early maturity duration (104 days) than the check varieties Phule Karala (106) and IGP 76 (107 days), bold seed with shining black colour, responsive to recommended fertilizer dose also, performing high yield under different doses of fertilizers.

IV. Conclusion

Being high yield potential, early maturity, resistant to diseases, more oil content high Linoleic acid and protein content, the variety was identified for released and notified in 2016 for Kharif rainfed condition of Maharashtra State for commercial cultivation to the farmers.

V. Acknowledgment

The author is thankful to all concerned scientist and the technical staff who helped in screening and evaluation of this genotype in various trials conducted in different locations.

References

[1] Anonymous, 2014.Project Coordinators Report of XIVth Annual Workshop on Sesame and Niger, JNKVV, Jabalpur (India).

[2] Panse, V.G. and P.V. Sukhatme. 1967. Statistical Methods for Agricultural Workers. ICAR Publ. New Delhi (India).

Table I: Summary of yield (kg/ha) performance of proposed variety IGPN-8004 in various trials (2008- 09 to 2013-14)

Year of testing	Name of the Trial	No. of locations (33)	Seed yield kg/ha		
			Proposed variety Phule Vaitarana (IGPN-8004)	Check variety Phule Karala (IGPN-2004-1)	Check variety IGP-76 (Sahyadri)
2008-09	Station Trial	1	610	513	466
2009-10	Multilocation Trial	4	370	295	317
2010-11	Multilocation Trial	5	414	339	314
2010-11	Initial Varietal Trial	5	664	--	525
2011-12	Multilocation Trial	6	335	294	276
2012-13	Multilocation Trial	5	460*	366	355
2012-13	Advance Varietal trial	7	516	-	454
2013-14	Adaptive trials	35	509	416	
	Average		**484.75**	**370.50**	**345.6(386.71)**
% increase over check					
2008-09	Station Trial	1		(+)18.90	(+)30.90
2009-10	Multilocation Trial	4		(+)25.42	(+)16.71
2010-11	Multilocation Trial	5		(+)22.12	(+)31.84
2010-11	Initial Varietal Trial	5		--	(+)26.47
2011-12	Multilocation Trial	6		(+)13.95	(+)21.38
2012-13	Multilocation Trial	5		(+)25.68	(+)29.57
2012-13	Advance Varietal trial	7		--	(+)13.66
2013-14	Adaptive trials	35		(+)22.35	
	Average			**(+)21.40**	**(+)26.08[(+)24.36]**

*Significant at 5% over the check
Figures in parenthesis indicate yields of coordinated trials

Table II: Incidence of diseases on IGPN-8004 (2010-11 to 2012-13)

Genotype	**Disease (score)**											
	Cercospora leaf spots (Cercospora guizoticola) (0 to 9 scale)				**Alternaria leaf spots** (Alternaria sp.) (0 to 9 scale)				**Powdery mildew** (Sphaerotheca sp.)			
Year	2010 (3 locations)	2011 (3 locations)	2012 (2 locations)	**Mean**	2010 (3 locations)	2011 (3 locations)	2012 (2 locations)	**Mean**	2010 (3 locations)	2011 (3 locations)	2012 (2 locations)	**Mean**
IGPN 8004	2.6	2.3	3.0	**2.6**	2.6	2.3	2.3	**2.3**	1.0	1.0	1.0	**1.0**
Phule Karala (c)	2.7	3.0	3.0	**2.9**	2.3	2.3	2.3	**2.3**	1.0	1.0	1.1	**1.0**
IGP 76 (c)	2.7	3.3	3.0	**3.0**	2.1	2.0	2.5	**2.2**	1.0	1.0	1.0	**1.0**
SE ±	0.25	0.20	0.24	**0.15**	0.16	0.20	0.19	**0.097**				
CD at 5%	NS	0.56	NS	**NS**	NS	NS	NS	**NS**				
C.V.%	17.58	13.68	11.12	**10.4**	13.52	16.77	11.31	**7.60**				

Table III: Incidence of pest on IGPN-8004 (2011-12, 2012-13)

Genotype								
	Semilooper (Achae janata) No./plant				**Caterpillar** (Perigaea capensis) No./plant			
year		2011 (	2012 (	**Mean**		2011 (	2012 (	**Mean**
IGPN 8004		2.0	1.2	**1.6**		2.00	2.66	**2.33**
Phule Karala (c)		2.0	1.4	**1.7**		3.00	3.44	**3.22**
IGP 76 (c)		3.6	3.0	**3.3**		4.33	4.33	**4.33**
SE ±		0.48	0.35	**0.19**		0.31	0.32	**0.25**
CD at 5%		1.41	1.047	**0.60**		0.92	0.96	**0.81**

General remarks- Moderately tolerant to semilooper and caterpillar.

Table-IV: Oil percentage and Oil yield (Kg/ha.) of proposed variety IGPN-8004 in comparison with checks

Year of testing	Name of the Trial	Oil %		
		Proposed variety IGPN 8004	Check variety Phule Karala	Check variety IGP-76
2010-11	IVT	35.42	35.41	34.97
2012-13	AVT	36.47	35.50	35.95
	Mean	35.94	35.45	35.46
		Oil yield (Kg/ha.)		
2010-11	IVT	235.18	--	185.90
2012-13	AVT	188.18	186.02	163.21
2012-13	MLT	145.95	125.97	124.28
	Mean	211.68	186.20	157.97
% increased over check			(+)21.65	(+)20.13

Table V: Quality parameters of IGPN-8004 in comparison with checks.

Year	Genotype	Protein (%)	Fatty acid compositions(Triglycerides)			
			Linoleic acid (%)	Oleic acid (%)	Palmitic acid (%)	Strearic acid (%)
2010-11	IGPN 8004	--	57.2	22.2	7.2	6.2
2011-12		--	59.9	23.8	11.3	7.6
2012-13		26.0	54.5	14.0	4.6	3.9
	Mean	26.0	57.2	20.0	7.7	5.9
2010-11	Phule Karala(c)	--	57.2	22.9	7.0	6.2
2011-12		--	57.0	26.9	10.7	6.2
2012-13		21.43	52.0	18.2	5.6	4.4
	Mean	21.43	55.4	22.7	7.8	5.6
2010-11	IGP-76 (NC)	--	53.5	19.8	6.6	5.9
2011-12		--	57.9	24.5	6.3	6.4
2012-13		23.37	53.8	13.9	4.8	3.8
	Mean	23.37	55.0	19.4	5.9	5.4

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