

A High Yielding Little Millet (Vari) Variety GNV-3 for Cultivation in Gujarat

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Abstract: The little millet culture WV-125 is a pure line selection from the germplasm accession. This has recorded an overall increase of 8.77 per cent in grain yield (2864 kg/ha) over the local check variety GV-2 (2633 kg/ha) and 43.92 per cent increase over the national check variety CO-2 (1990 kg/ha). The culture matures in 112-115 days. The culture WV-125 has 7.5- 8.0 branches per panicle and 36.6 cm average panicle length. It endows with the special attributes of easy threshability, synchronised maturity and non-lodging growth habit. It is rich in calcium (242.70 mg/100g), phosphorus (410.9 mg/100g), manganese (235.2 mg/100g) and good amount of protein (5.78 %), fat (1.43 %) crude fibre (3.56 %), carbohydrates (67.10 %) and minerals (2.30 %). This culture is moderately resistant to diseases like Blast (Leaf, Neck and Panicle) and moderately resistant to grain smut (%) and sheath blight when compared with local check GV-2 and national check CO-2. WV-125 little millet culture has been released as a new variety GNV-3 (Gujarat Navsari Vari-3) during the year 2016 for cultivation during kharif as rainfed in Gujarat Agro-climatic Zone- I, II & III i.e. Hilly/Tribal little millet growing region of Gujarat.

Keywords: Little millet, high yielding variety, yield attributing characters, nutritional quality etc.

INTRODUCTION

Little millet (*Panicum miliare* L.) is grown in India under varied agro-ecological situations. India is well known for its rich agro-biodiversity. Besides the food crops viz., rice, wheat, maize, sorghum and pearl millet, there are other food and feed crops grown in the country. Among the other crops, hill millets figure prominently which include finger millet (ragi, nagli), little millet (vari, kutki), kodo millet (kodra), foxtail millet (kang), proso millet (cheena) and barnyard millet (banti). The hill millets are grown over an area of around 1.88 million hectares in India of which little millet accounts for 25 per cent of area and of the 1/3rd of the production of total small millets. In Gujarat, little millet is cultivated in an area of 5281 hectare with an average productivity of 715 kg/ha. Not with standing low contribution of these crops to the national food

baskets, small millets offer enormous advantages such as early maturity, wide adaptation and high nutritive value of both grain and fodder. They are grown on diverse soils in the area with wide difference for thermo and photoperiod. These unique qualities have made them as choice crop to rainfed, tribal and hill agriculture where options of crops are limited. Besides this now a day awareness regarding nutrition is increased which also increased the demand of hill millets.

Little millet is a hardy crop which can withstand drought better than most of other cereal crops and water logging to a certain degree (Gautam and Kaushik, 1981). In Gujarat, generally little millet crop is grown in hilly tract of Dangs and Valsad district and locally known as 'Vari'. The productivity of other hill millets except finger millet, is low due to poor soil fertility and age-old

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cultivation methods. Small millets area in the country has come down substantially in the last two decades and is likely to go down further in coming years; particularly in other small millets except finger millet.

However, small millets are raised on lands where no other crop worth mentioning can give a reasonable quantity of nutritionally balanced grain and valuable straw yields. It is good source of protein, very rich in carbohydrate, fat, mineral and vitamins and should be considered as essential food for nutritional security (Nirmalakumari *et al*, 2010). Hence, these crops need attention of scientists, developmental agencies, processors, nutritionists and policy makers in order to not only sustain the production but also to enhance demand so that millet farmers can be benefited.

The variety Gujarat Vari-1 released during 1995 and then variety Guj. Vari.-2 was identified during 2006. In view of this, Hill Millet Research Station, Waghai had selected this genotype through pure line selection from the collection of local land races. Considering present need, early maturing, multi tillering, high yielding with diseases and pest resistance and good nutritional qualities new genotype Gujarat Navsari Vari-3 was developed.

MATERIAL AND METHODS

The little millet culture WV-125 was evolved at Hill Millet Research Station, Navsari Agricultural University, Waghai (Dangs) and proposed for release as Gujarat Navsari Vari-3 (GNV-3) during the year 2016. It is a pure line selection from the germplasm accession.

Single plant with desirable traits and high yield with medium maturing and moderately resistant to blast and grain smut disease was selected from the germplasm accession and was forwarded as single plant to progeny rows. The promising culture was evaluated over nine years with checks at Waghai locations starting from 2007-08 to 2015-16, on farm trials during *kharif* 2015-16 in farmer's field of Dangs districts. Besides, the reaction of the cultures against important pest and disease was screened and as per the standard procedures the grain qualities were analyzed.

RESULTS AND DISCUSSION

The evaluation of Large Scale Varietal Trials data of the culture WV-125 from the station trials at Hill Millet Research Station, Waghai (Dangs) are presented in Table 1. The culture WV-125 was tested in station trials at Waghai from 2007-08 to 2015-16.

Table 1
Comparative year wise performance and per cent increase over checks of little millet culture WV-125 at Waghai location over nine years per locations

Sr. No.	Name of the experiment and year	No. of entries	Name of entries					% increase over checks	
			WV-125	GV-2 (LC)	CO-2 (NC)	CD at 5 %	CV%	GV-2 (LC)	CO-2 (NC)
1.	LSVT-2007-08	6 + 2 = 8	2788*#	2345	2151	189	5.33	18.89	29.61
2.	LSVT- 2008-09	6 + 2 = 8	3649*#	2999	2543	189	11.84	21.67	43.49
3.	LSVT-I 2009-10	6 + 2 = 8	2731#	2583	2228	453	10.50	5.73	22.58
4.	LSVT-I 2010-11	6 + 2 = 8	2541	2500	2243	327	8.01	1.64	13.29
5.	LSVT-I 2011-12	6 + 2 = 8	2603#	2778	1399	512	15.5	-	86.06
6.	LSVT-II 2012-13	6 + 2 = 8	3004#	2737	2449	530	11.8	9.76	22.66
7.	LSVT 2013-14	8 + 2 = 10	2469*#	2148	1798	282	9.37	14.94	37.32
8.	LSVT 2014-15	6 + 2 = 8	2930#	3119	2062	627	15.35	-	42.10
9.	LSVT 2015-16	6 + 2 = 8	3060*#	2486	1033	450	12.79	23.09	196.22
Over all Mean			2864	2633	1990			8.77	43.92

Note: *Significantly superior over GV-2 (LC) and # significantly superior over CO-2 (NC)

At Waghai, the culture WV-125 recorded an average grain yield of 2864 kg/ha where as the check GV-2 recorded 2633 kg/ha and CO-2 recorded 1990 kg/ha grain yield, which is 8.77 and 43.92 per cent increased yield over check GV-2 and CO-2, respectively. The overall performance of culture WV-125 in farmer's field trial at various villages of Dangs, recorded an average grain yield of 934 kg/ha, which was 27.42 percent higher over the check variety GV-2 (733 kg/ha).

Morphological Characters

The morphological characters of the culture WV-125 are preferable by the farmers as compared to local check GV-2 and comparisons of various morphological characters are presented in Table 2. The culture WV-125 has more number of average branches per panicle (8 branches/panicle) as compared to local check GV-2 (7 branches/panicle).

Number of productive tillers is also higher in culture WV-125 (6.5) as compared to local check GV-2 (5.0). The culture WV-125 matures in 112-115 days and attains 50 per cent flowering in 70-72 days after sowing which is earlier than the local check GV-2 (120 days). It has an erect plant habit with 142-145 cm plant height. The panicle is dense with panicle length 36.6 cm. Grain weight of 1000 fully developed grains is also increased in the culture WV-125 (1.89 g) as compared to local check GV-2 (1.79 g). The undecorticated grain colored noted is attractive yellow and decorticated grain colour is clean white (Table 2).

Considering the superior performance of the culture WV-125 over the check varieties namely GV-2 and CO-2, the culture WV-125 released as a new variety GNV-3 (Gujarat Navsari Vari-3) for large scale cultivation in south and middle Gujarat during 2016.

Table 2
Descriptive Morphological/Botanical characters of WV-125 (GNV-3) and GV-2 as per DUS

Sr. No.	Characteristics	WV-125 (GNV-3)	GV-2
1.	Leaf: intensity of green colour	Dark	Medium
2.	Leaf: width of blade	Medium (2-3.5 cm)	Medium (2.5-3.5 cm)
3.	Time of heading (50% of plants with panicle)	Medium (70)	Medium (79)
4.	Male sterility	Absent	Absent
5.	Colour of stigma	White	White
6.	Stem: thickness	Very Thick and Greenish with reddish strips	Very thick and Greenish Pink strips
7.	Stem: length (excluding panicle)	Medium(142 cm)	Short (127 cm)
8.	Panicle length (cm)	36.6	37.3
9.	No. of branches/panicle	8.0	7.0
10.	Habit of Panicle	Dence	Dence
11.	Plant type	Erect	Erect
12.	Foliage colour	Green	Green
13.	Flag leaf: attitude of blade (late observation)	Absent	Absent
14.	Number of productive tillers per plant	6.5	5.0
15.	Panicle: awns	Absent	Absent
16.	Panicle: presence of secondary branching	Present	Present
17.	Time maturity(Days)	Medium (112)	Late (120)
18.	Grain weight of 1000 fully developed grains	Medium (1.89 g)	Medium (1.79 g)
19.	Un decorticated grain colour	Yellow	Yellow
20.	Decorticated grain colour	White	White
21.	Lodging	Non-lodging	Non-lodging

Table 3
Average reaction of WV- 125 against major diseases of little millet at Waghai for the year 2014-15 to 2015-16.

Sr. No.	Name of entry	Reaction to Blast (PDI)			Reaction to Grain Smut (%)		
		Leaf Blast	Neck blast	Panical blast	Grain Smut (GB)	Grain Smut Severity (%)	Sheath Blight (BSG)
1.	WV- 125	0.0	0.0	0.0	1.2	0	0
2.	GV- 2 (LC)	0.2	0.0	0.0	3	0	2
3.	CO-2 (NC)	0.5	0.2	0.0	3.7	1.3	1

Table 4
Average reaction of WV- 125 against important pests of little millet at Waghai for the year 2014-15 to 2015-16.

Sr. No.	Name of entry	Aphids grade (1-10)	Dead hearts %
1.	WV- 125	1.00	0.5
2.	GV- 2 (LC)	1.00	0.5
3.	CO-2 (NC)	1.50	1.5

Note: The infestation of any insect- pest was observed at very low intensity in little millet under the study at Waghai location.

Table 5
Nutritional value of culture WV-125 as compared to checks. (per 100 g)

Name of Culture	Protein (%)	Fat (%)	Mineral matter (%)	Crude fiber (%)	Carbo-hydrates (%)	Ca (%)	P (mg)	Fe (mg)	Mg (mg)
WV-125*	5.78	1.43	2.30	3.56	67.10	242.70	410.9	3.86	235.2
GV-2*	6.60	1.40	2.46	3.34	71.90	155.70	404.3	3.77	239.5

Note: *Food Quality Testing Laboratory, NAU, Navsari.

Reaction to Pest and Diseases

Blast, sheath blight and grain smut are the major diseases and the genotype WV-125 moderately resistant to diseases (Table 3) when sown in normal growing *khari* season. Similarly, there proposed culture showed resistant to pest like aphids and stem borer (Table 4).

Nutritional Quality

The culture WV-125 nutritionally better which possessed high calcium (242.70 mg/100 g), phosphorus (410.9 mg/100 g) and good amount of protein, fiber, carbohydrates and minerals as compared with the checks (Table 5). Similarly,

Chaudhari *et al* (2012) also reported superior nutritional quality of little millet variety GV-2.

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