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Plant Germplasm Registration Notice*

The Plant Germplasm Registration Committee of ICAR in its XXVIIIth meeting held on January 31st, 2014 at the National Bureau of Plant Genetic Resources, New Delhi, approved the registration of following 23 germplasm lines out of 74 proposals considered. The information on registered germplasm is published with the purpose to disseminate the information to respective breeders for utilization of these genetic stocks in their crop improvement programmes. Upon request, the developer(s)/author(s) is/are obliged to distribute the material for crop improvement programme of National Agricultural Research System.

1. PHULE G-00109 (IC0598237; INGR14001), a Chickpea (*Cicer arietinum*) Germplasm with Resistance to Wilt

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PHULE G-00109 (IC0598237; INGR14001) is a chickpea (*Cicer arietinum*) germplasm with resistance to wilt developed by hybridisation followed by pedigree selection of IG-9216 x ICCV-10 at ICRISAT, (AP).

Associated characters and cultivated practices

- Resistant to *Fusarium* wilt disease
- Medium maturity (102 days)
- High average yield (2113 kg/ha)
- Bold seed size (25 g/100 seeds).

Morpho-agronomic Characteristics of Phule G-00109

Entry	Year	Yield (kg/ha)	Maturity days	Plant height (cm)	Plant spread (cm)	Fruiting branches per plant	Pods/plant	100 seed wt. (g)
PG-00109	2004-05	2114(3)*	100	34.9	15.1	11.1	32.1	25.6
	2005-06	1882(3)*	107	49.4	14.6	15.5	38.4	26.1
	2006-07	2250(5)*	98	38.7	16.0	12.5	37.1	23.8
Mean		2113	102	41.0	15.2	13.0	35.8	25.1

*Figures in parentheses indicates number of test locations

Recommended cultivation practices: Seed rate: 85 Kg/ha; Spacing: 30x10 cm, fertilizer dose 25:50:30 NPK kg/ha, Suitable for rainfed and irrigated conditions.

*Compiled and edited by: Anjali Kak and RK Tyagi, Division of Germplasm Conservation, National Bureau of Plant Genetic Resources, Pusa Campus, New Delhi-110012

2. NIC7133, SD5-1278 (IC013884; INGR14002), a Safflower (*Carthamus tinctorius* L.) Germplasm with Resistance to Fusarium Wilt (*Fusarium f.* sp. *carthami*)

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A safflower landrace from Uttar Pradesh, IC13884 (NIC7133[SD5-1278]) was identified for resistance to *Fusarium* wilt caused by *Fusarium oxysporum* f.sp. *carthami*. The accession was received from NBPGR Regional Station, Akola during 1990-91 at the Germplasm Maintenance Unit (GMU) of Safflower at Solapur, assigned the alternate ID GMU 4983 and maintained. Subsequently, the accession is being maintained at Directorate of Oilseeds Research (DOR), Hyderabad since the year 2000.

It has undergone screening against *Fusarium* wilt pathogen (*Fusarium oxysporum* f. sp. *carthami*) under wilt sick plot conditions since 2003-04 and has exhibited consistent resistant reaction to wilt (Disease intensity: 0-10%) for 3 consecutive years (2003-04 to 2005-06) when the susceptible check 'Nira' showed 88.3-100% wilt incidence across locations (Tandur and Solapur) and years (Table 1) (Anonymous, 2004, 2005, 2006; Suresh *et al*, 2009). The resistance against wilt was confirmed through pot culture during 2010-11 (Anonymous, 2011) and *in vitro* screening by using fusaric acid method (Anonymous, 2012) during 2011-12 (Anjani *et al*, 2012) (Table 2).

The accession has serrate lower leaf margins, yellow colour of corolla turning to orange at faded stage, spiny outer involucral bracts, base to apical branching pattern, medium plant height, medium sized capitula, seeds with thick hull and oil content ranging from 26-28%.

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Table1. Field evaluation of NIC 7133[SD5-1278] / GMU 4983 in wilt sick plot

Year	Centre	Disease incidence (%)	
		GMU 4983	Nira (Susceptible check)
2003-04	AICRP (Safflower) Tandur	0	98.0
2004-05	AICRP (Safflower) Tandur	<10	100.0
2005-06 (UDN)	AICRP (Safflower) Tandur	0	88.3
	AICRP (Safflower) Solapur	<10	98.7

Table 2. Laboratory confirmation of *Fusarium* wilt resistance of NIC 7133[SD5-1278] / GMU 4983

Year	Centre/Method	GMU 4983	Nira (Susceptible check)
2010-11	DOR, Hyderabad, Pot culture	<10% wilt incidence	>80% wilt incidence
2011-12	AICRP (Safflower) Solapur [*In vitro* Fusaric acid method]	Survival 15 days (resistant reaction)	Survival 3 days (susceptible reaction)

3. DPC-16 (IC0598621; INGR14003) a Unique Pistillate Line of Castor (*Ricinus communis* L.) with Unique Morphotype of Flower, Stem Colour and Zero Bloom with Hermaphrodite Flower at Tip

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DPC-16, a pistillate line with a unique morphotype i.e. hermaphrodite flower at the tip of the pistillate spike, was developed at Directorate of Oilseeds Research, Hyderabad. Castor, a member of *Euphorbiaceae*, is a sexually polymorphic species with unisexual flowers, either male or female mostly arranged as monoecious and occasionally pistillate spikes. The plant consists of several series of determinate branches each terminated by a raceme. The development of raceme along any one axis is sequential; thus it is possible to have racemes at all stages of development. The basic sex forms in castor are monoecious and pistillate. Monoecious (M**)** is the most natural occurrence of annual and perennial castor. The spike has basal 1/3 to 1/2 male flowers while the top portion has female flowers. In between these, few whorls have both male and female flowers in an interspersed fashion. Pistillate (P) occurs as a rare recessive mutant with the spike having female flowers throughout the spike. Interspersed Staminate Flower (ISF) is a variant of pistillate form with male flowers interspersed, throughout the female flowers on the spike which helps in maintenance of pistillate line. Sex reversion from pistillate to monoecious is the most common problem encountered in the seed production plots.

Three types of pistillate mechanism N, S and NES types were utilized for development of pistillate lines in castor. The N type is governed by recessive sex switching gene and maintained by sib mating. In USA, N type of pistillate lines *viz*., Nebraska 145-4, CNES-1 were used for development of castor hybrids (Classen and Hoffman, 1950). S type pistillate line was obtained by selection within sex reversals at the Weizmann Institute, Israel and governed by dominant and epistatic effects (Shiffriss, 1960). NES type is governed by a recessive sex-switching gene in combination of environmentally sensitive genes for ISF expression. NES type is a combination of both N and S type as it carries the homozygous recessive gene for pistillateness and environment sensitive genes for ISF (Kulkarni and Ankineedu, 1966). Among the three types of pistillate lines-N, S and NES, S type is the most commonly used in heterosis breeding in India while the diverse source NES is underexploited due to the lack of suitable combiners (Lavanya *et al*., 2006).

Efforts initiated at the Directorate of Oilseeds Research to enhance the genetic diversity of pistillate lines using NES source led to identification of the genetic stock DPC-16 in a segregating population of the cross NES-6 x TMV-5 with the unique trait of a single hermaphrodite flower at the tip of the spike (Lavanya, 2002 and Lavanya, 2009). Heritability of the trait was observed up to 80-90 % in a population of nearly 60-100 plants every year. The trait was further stabilized by selfing the pistillate line with hermaphrodite flowers in ten generations. The proposed stock has other distinct morphological characters like red stem, zero bloom, medium long (25-30 cm), semi-compact spike with spiny capsules (Table 1). The stem color of the plants was very distinct without any bloom and initially coined

Table 1. Chief botanical and morpho-agronomic traits of DPC-16

Trait	DPC-16
Stem color	Red
Presence of bloom	Zero (absent)
Type of internodes	Elongated
Number of nodes up to primary spike	12-16
Leaf shape	Flat
Branching pattern	Divergent
Spike shape	Cylindrical
Spike compactness	Semi compact
Sex expression	Pistillate; hermaphrodite flower at the top
Capsule: spininess	Spiny
100-seed weight (g)	Medium (21-30)
Seed shape	Oval
Seed base color	Brown
Seed mottling	High
Seed caruncle	Inconspicuous

as "purple" and later modified as "red" stem color as per the RHS color chart (Ref. No. RHA 187A). The genetic stock has a potential to use in the heterosis breeding as a diverse source of pistillate line and will also be further useful in the study of sex polymorphism in castor and development of genetic stocks for distinct sex expression.

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4. RG 2818 (IC0346622; INGR 14004) a Castor (*Ricinus communis* L.) Germplasm with Resistance to Wilt (*Fusarium oxysporum* f. sp. *ricini*)

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RG2818 (IC346622) was selected from the original heterogeneous population of KA68/01 collected from Tamil Nadu State of India. It had undergone nine generations of self-pollination. It was tested for resistance against *Fusarium* wilt and evaluated for agronomic and yield traits along with other germplasm collections at the Directorate of Oilseeds Research, Hyderabad.

RG2818 was screened against *Fusarium* wilt (*Fusarium oxysporum* f. sp. *ricini)* in wilt sick plots at DOR, Hyderabad and SK Nagar, Gujarat for six

Table 1. Reaction of RG 2818 against *Fusarium* wilt (*Fusarium oxysporum* f.sp. *ricini)*

Year of screening	Method of screening	Wilt incidence (%) in RG 2818		Wilt incidence (%) in susceptible checks*	
		DOR, Hyd.	S.K. Nagar	DOR, Hyd.	S.K. Nagar
2002-03	Wilt sick plot	5.0	0.0	95.8 (Aruna)	91.9 (GAUCH-1)
2003-04	Wilt sick plot	0.0	0.0	88.5 (VP-1)	98.5 (GAUCH-1)
2003-04	Confirmation of resistance under artificial epiphytotic conditions in glasshouse using root-dip inoculation technique.	7.1	0.0	71.4 (Kranti)	97.5 (GAUCH-1)
2004-05	Wilt sick plot	8.3	0.0	86.4 (VP-1)	100 (JI-35)
2004-05	Confirmation of resistance under artificial epiphytotic conditions in glasshouse using root-dip inoculation technique.	0.0	0.0	84.6 (JI-35)	100 (GAUCH-1)
2006-07	Wilt sick plot	0.0	16.7	100 (VP-1)	96.7 (JI-35)
2007-08	Wilt sick plot	16.6	0.0	100 (JI-35)	100 (JI-35)
2010-11	Wilt sick plot	0.0	0.0	93.8 (Kranti)	100 (JI-35)

*The entries in parentheses are wilt susceptible checks

years. *Fusarium oxysporum* f.sp. *ricini* inoculum was being maintained in wilt sick plots by adding wilt inoculum at regular intervals. Susceptible check was grown after every 10 rows of test entries in wilt sick plots to ensure uniform disease expression across the sick plot. Resistance reaction of RG2818 was further confirmed twice under artificial epiphytotic conditions in glasshouse using root dip inoculation method (Raoof and Nageshwar Rao, 1996) at DOR, Hyderabad and S.K Nagar. It consistently exhibited resistant reaction (0-16.7% wilt incidence) whereas the susceptible checks exhibited 71.4-100% wilt disease incidence (Table 1). The scale proposed by Mayee and Datar (1986) was used to rate the reaction against wilt. Any genotype showing <20% wilt incidence is rated as resistant.

RG2818 is has red stem with high node number and bloom. Its raceme is cylindrical in shape, loose and covered with more male flowers than pistillate ones. Capsules are green, big, spiny and non-dehiscent. In addition to wilt resistance, RG2818 is a high yielding accession, with yield capacity around 200g/plant. It is a medium maturity duration type.

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5. CJ-3 (IC0598611; INGR 14006), a Physic nut (*Jatropha curcas* L.) Germplasm with High yield, Early Flowering (125 Days) and High Oil Content (38.01%)

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Oil from *Jatropha curcas* as a source of biodiesel a renewable liquid fuel and its biochemical properties are near equivalent to petro-diesel after transesterification (Paramathma *et al.,* 2007 and 2012). The parent TNMC-7 (*Jatropha curcas*) has unique characters such as green pithy soft stem, with 170-183 days to first flowering (Annonymous 2004-05 and 2005-06) with a seed yield of 0.258, 1.225 and 1.384 kg/plant in the first, second and third years respectively.

J.integerrima was as male donor parent with moderate resistance to pest and diseases, dwarf (1.342–1.564 m), petal colour pink, with long peduncle (Paramathma *et al*, 2007) and flowering in 150-163 days, small single seeded capsule, with poor yield of 15-20 g/plant/year (Rathakrishnan and Paramathma, 2009). In order to improve seed yield, stem quality and flowering inter specific hybridization was made between two diverse species of *J. curcas* (TNMC-7) and *J.integerrima.* The F_1 progenies were back crossed with TNMC-7 as female parent and CJ-3 was selected at Forest College and Research Institute, TNAU, Coimbatore.

Morpho-agronomic characters: The unique traits of CJ-3 (13143; IC0598611) posses semisolid stem, with pigmentation of Pale green and brown mottle, early (125-135 days), non-seasonal, continuous flowering for eight months (Paramathma 2012), reticulate, tri lobbed, rarely 4 lobbed pod, Seed testa colour - Black 202, Group A, posses 38.01% seed oil and seed yield of 0.442, 2.047 and 2.612 kg/plant/year from first, second and third year respectively (Viswanathan *et al.,* 2012).

Associated characters and cultivated practices for CJ-3 (INGR14006)

The culture CJ-3 also susceptible to mealy bug and root rot disease and it is at early stage of MLT trials. Two kg of seeds are required for planting one ha. The seeds may be soaked in water for 12 hours and the treated seeds should be sown in 10x20 cm poly bags. After 90 days, field planting has to be done with pits of size 30x30x30 cm at a spacing of 3x2 m (1660 seedling/ha) by adding 10 g/pit of *Pseudomonas fluorescence*t. Two split dose of urea, super phosphate and potash @ 20:120:60 g/seedling have to be applied. Life saving irrigation needed immediately after planting and afterwards at an interval of 20-30 days. First pruning has to be done at a height 45 cm from the ground level.

Table 1. Salient characteristics of morpho-agronomic description of CJ3

Description of variety and Name	CJ-3
Plant height (cm)	290.4
Collar diameter (cm)	11.36
No. of primary branches	2.87
No. of secondary branches	12.07
Branching pattern	Dichotomous branching
Stem pigmentation	Pale green with brown mottle
Stem surface	Rough
Types of inflorescence	Cymose - Panicle
Anthesis	7.00 am
Petal color	Green
Leaf color	Light green
Leaf shape	Cordate with rudimentary tri-lobbed
Leaf surface	Smooth
Leaf tip	Acuminate
No. of fruiting bunches	40.33
Seed beak	Prominent
Pod reticulation	Three lobbed, rarely 4 lobed
Testa colour	Black 202, Group A
Peduncle	Long pendulous
Pod size	Medium (Length: 2.44 cm, Width: 2.34 cm)
Pod shape	Elongated
Seed shape	Ovate
Seed size	Medium (Length: 2.04 cm, Width: 1.54 cm)
Days to 50% flowering (days)	125-135
Maturity (days)	175-185
Maturity group (early, medium and late)	Early
Reaction to major disease under field conditions	Susceptible to root rot
Reactions to major pests (under field conditions)	Susceptible to mealy bug
Oil content (%)	38.01%
Seed yield (station/demonstration trials) kg/plant	0.442/1st year,2.047/ 2nd year, 2.612/3rd year

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6. SD23/6 (IC208366; INGR14007), a Pea (*Pisum sativum*) Germplasm with Resistance to Four Isolated Strains of Powdery Mildew (*Erysiphe pisi*) viz. *rangway, trilkinath, stingri* and *kangra*

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7. SD23/57 (IC208378; INGR14008), a Pea (*Pisum sativum*) Germplasm Resistance to Four Isolated Strains of Powdery Mildew (*Erysiphe pisi*) *viz. rangway, trilkinath, stingri* and *kangra*

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8. G-389 (IC0596521; INGR14009), a Garlic (*Allium sativum* L) Germplasm for earliness

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Generally garlic varieties developed by different organization takes about 130-270 days to attain physiological maturity. Now a day's there is no variety available for growing during *Kharif* season having early maturity in India. In this chain NHRDF has recently identified a new garlic genotype "G-389" which is being harvested within 72-80 days during *Kharif,* late *Kharif* and 85-95 days in *Rabi* season, about 40-50 days earlier than other garlic varieties grown in India. This variety was developed through mass selection at Nashik. Plant height is up to 45-60 cm with 7-8 green leaves/plant. Neck thickness ranged between 0.75-1.0

cm. Colour of bulb is white with pinkish tinge. Bulbs are compact attractive and diameter of bulb is 2.80-3.50 cm, size index 9-12 cm^2, cloves varies from 18 to 25 and 50 bulb weight is about 450-600 g. The length of clove 1.25-2.0 cm, width 0.75-0.90 cm and size index of clove is 1.5-2.0 cm^2. Average yield 60-75 q/ha with good storage capacity.

Morpho-agronomic characteristics: The plant is medium tall in height; pseudo-stem and leaf are green in colour, erect and slightly narrows than other varieties. The experiment was carried out at RRS, Nashik and (pooled data presented in Table-1), revealed that the highest plant height (43.94 cm), leaf breadth (0.83 cm), number of cloves/bulb (22.17), bulb diameter (3.23 cm), weight of 20 cloves (0.23 g) and gross yield (68.06 q/ha) were recorded in G-389 where plant height, leaf breadth and weight of 20 cloves were found at par in Amleta local check, however, highest number of leaves (6.70/plant) was recorded in local check Amleta and found at par with G-389. A crop should produce sufficient number of leaves to harness light energy and synthesize adequate photoassimilate for biomass production. It is also reported that increase in bulb weight was associated with increase in plant height, leaves per plant, bulb diameter, higher number of cloves per bulbs and cloves weight. (Singh *et al.,* 2011; Singh *et al.,* 2012; Islam *et al.,* 2004; Singh and Chand, 2003). The genotype "G-389" took minimum period (76 days) for physiological maturity *i.e.* for harvesting the crop (Anonymous, 2010) followed by the local check Amleta which took 99 days for maturity of the crop. Thus it is concluded that the G-389 recorded about 23 days early maturity and also gave about 18% higher yield over the local check and promise for its cultivation successfully during *Kharif* season.

Associated characters and cultivation practices: The highest total soluble solids (38.83 %) and dry matter content (40.84 %) were recorded in G-389 though it showed non-significant differences. In general cool growing period gives more yields. It can be grown better on fertile, well drained loamy soils. The optimum soil pH range is 6–7. About 500-700 kg cloves are required for one hectare, care should be taken to select bigger cloves preferably from the outer side of the bulbs. 25 t FYM, 100 kg N, 50 kg P, 50 kg K and 40-50 kg S/ha through chemical fertilizers has been recommended. Because of small cloves it is planted with spacing of 10 x 7.5 cm to get optimum bulb yield. Garlic needs irrigation at an interval of 10-12 days during vegetative growth and 8-10 days during maturation. Drip irrigation can also be used for high yield and quality bulbs. Pendimethalin @ 3.5 liter or oxiflurofen (goal) @ 2.5 liter/ha + 1 hand weeding gives good control of broad leaved weeds. Spray of Multi K (13:0:45) at 50 and 65 days after planting improve the quality of the bulbs. 10-15 days before harvesting, irrigation should be stopped otherwise it can be splitted re-sprout and decrease yield and market values.

The crop is considered ready for harvesting when the tops turn light yellowish or brownish and show signs of drying. Curing is additional process of drying to remove the excess moisture and to allow the bulbs to become compact and go into dormant stage and within a week in the field to dry the bulbs thoroughly, after that cured for 7-10 days in shade either with tops or after cutting the tops by leaving 2.0-2.5 cm from bulbs and send in the market after proper sorting and grading for sale. It can be stored in bundles along with foliage or in hessian bag or leno bags after foliage cut in ventilated go-downs.

Table 1. Pooled data evaluation of garlic Genotypes for earliness at RRS, Nasik for 2011-12

Treatments	Plant height (cm)	No. of leaves/ plant	Leaf length (cm)	Leaf breadth (cm)	No. of cloves/ bulb	Bulb diameter (cm)	Cloves diameter (cm)	Wt. of 20 cloves (g)	TSS (%)	Dry matter (%)	Gross yield (q/ha)
G-389	43.94	6.27	25.47	0.83	22.17	3.23	0.68	0.23	38.83	40.84	68.06
G-391	39.47	5.34	22.43	0.72	19.24	2.87	0.62	0.20	37.84	39.80	49.66
Yamuna Safed-3 (G-282) (C)*	33.83	5.04	24.67	0.61	----	2.57	----	----	----	----	----
Amleta local (C)	42.40	6.70	25.60	0.78	19.83	2.96	0.68	0.21	38.33	40.17	57.69
S. Em±	1.54	0.28	1.35	0.02	0.33	0.06	0.02	0.01	0.53	0.43	2.03
CD at 5%	4.90	0.91	NS	0.08	1.42	0.18	NS	0.04	NS	NS	8.71

*Note: Clove separation did not take place

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9. DPO-296-4 (IC0598208; INGR14010), a Golden Yellow Leaf Colour Mutant of Isabgol (*Plantago ovata* Forsak) Germplasm

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Isabgol is an important medicinal plant mainly used as laxative worldwide and India is the sole exporter of this crop to the world market. Isabgol husk, the seed epidermis having muco-polysaccharide layers, is widely used against constipation, diarrhoea and intestinal irritation. Isabgol is also an excellent source of dietary fiber and has hypocholaesterolemic activity and is widely accepted as food additive in several processed materials like cookies, ice-cream, bread, etc. (Trautwein *et al.*, 2000). This crop is mainly cultivated in arid and semi-arid regions of Gujarat, Rajasthan and parts of Madhya Pradesh as rain-fed *Rabi* crop where intermittent drought limits Isabgol production. It is an introduced crop and the genetic variability available in India is low. To handle the IPR issue, it is necessary to have sufficient DUS descriptors. PPVFR has released the isabgol DUS guidelines with 15 descriptors and more descriptors are to be added for easy and accurate identification of isabgol variety/germplasm. In this direction, first time, a golden yellow colour leaf mutant (DOP-296-4) has been identified at DMAPR and it can effectively use as one of the descriptors for identification of isabgol genotypes.

DPO 296-4 has golden yellow colour leaves; the leaf pubescence is medium and narrow leaf bread (0.6 to 1.0). It has erect plant growth habit with 5-15 branches and medium height (25-35 cm). The spike arrangement is compact, spike-peduncle is unbranched, spike flower arrangement is compressed with 3-7 cm spike length and about 50 spikes/plants. The 1000-seed weight of spike is low.

DOP-296-4 will be useful to own the Intellectual Property Rights (IPR) the isabgol varieties being released

as it has an important morphological and qualitatively controlled marker characters that should be effectively used as one of the DUS characters. In this context, the golden yellow leaf mutant, DPO 296-4 reported herein may be useful genetic resources that can be incorporated into the high yielding commercial varieties for its easy identification.

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10. SBI 2007-291 (IC0598475; INGR14011), a Sugarcane (*Saccharum* spp. Hybrid) Germplasm with Early High Sucrose

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11. DMR QPM 58 (IC0594368; INGR14012), a Quality Protein Maize (*Zea mays*) Germplasm with Early Maturity

12. DMR QPM-03-124 (IC0594269; INGR14013), a Quality Protein Maize (*Zea mays*) Germplasm with Medium Maturity

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Maize is a major cereal crop for both human and livestock nutrition, worldwide. Several million people, particularly in the developing countries, derive their protein and calorie requirements from maize. Therefore, this vast segment (human population) depends upon cereals for their nutrition and livelihood. Protein from cereals including normal maize, have poor nutritional value because of reduced content of essential amino-acids such as lysine and tryptophan. Quality Protein Maize (QPM) is an improved version of maize that contains higher amount of lysine and tryptophan with lower amount of leucine and isoleucine in the endosperm than those contained in normal/conventional maize. Such balanced combination of amino acids in the endosperm results into its higher biological value ensuring more availability of protein to human and animal than normal maize. Hence, an attempt was made to develop inbred lines with higher concentration of tryptophan and lysine which may be used in the hybrid breeding program. Given below is the information on QPM lines registered as unique germplasm.

DMR QPM 58 (IC 0594368; INGR14012)

DMR QPM 58 (IC 0594368, INGR 14012) is an early maturing QPM line with low anthesis silking interval (ASI), high tryptophan (0.67%) and high protein content (9.40%). This inbred line has been developed after evaluating, selecting and selfing for 5-7 generations of Shakti 1, a quality protein maize OPV.

Morpho-agronomic characteristics: In the present study, a set of elite QPM inbred lines (*o-2* with hard endosperm) along with check entries (normal as well as QPM) was evaluated under Delhi conditions for *per se* performance as well as biochemical traits i.e. protein (%) and tryptophan in protein (%). Data was recorded on various parameters *viz*., phenology, agro-morphology and quality along with DUS-related characteristics. This inbred line has small ($<45^0$) leaf angle with straight leaf

attitude. It showed early anthesis (47 days) as well as silk emergence (48 days) with low ASI of one day. It has purple brace roots, glumes (of tassel) and silk. However, anthers are green. The tassel is dense with straight tassel branches. The tassel angle between main axis and lateral branches as well as leaf width of blade is narrow. The plant height is short (105 cm) with low ear placement. The ear shape is cylindrical with orange round shaped grains. It has medium ear number of rows of grains and small 1000 kernel weight of 122g (Kaul *et al.,* 2012).

DMR QPM-03-124 (IC 0594371; INGR14013)

DMR QPM-03-124 (IC 0594369, INGR 14013) is a medium maturing QPM line with low anthesis silking interval (ASI), high tryptophan (0.65%) and high protein content (8.77%). This inbred line has been derived from Shakti-1, quality protein maize OPV after evaluating, selecting and selfing for 5-7 generations.

Morpho-agronomic characteristics: DMR QPM-03-124 is medium maturing QPM line with 0.65% tryptophan in protein (Kaul *et. al.*, 2012). It showed medium anthesis (52 days) and silk emergence (53 days) with low ASI of one day. This inbred line has small ($<45^0$) leaf angle with straight leaf attitude. It has purple brace roots, glumes (of tassel) and silk. However, anthers are green. The tassel is dense with straight tassel branches. The plant height is short (114 cm). The ear shape is conico-cylindrical with yellow flint grains. It has medium ear placement and medium kernel weight (166g).

References

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13. DMRE 63 (WNZPBTL 9) (IC0594373; INGR14014), a Maize (*Zea mays*) Germplasm with Resistance to Pink Borer

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Maize (*Zea mays* L.) is grown predominantly during *Kharif* season in northern parts whereas continuous cropping is practiced during *Kharif* and Rabi seasons in Southern and Eastern India. The average productivity of maize in our country is much lower than its potential. Lack of proper pest management is one of the reasons for the lower productivity. The lepidopteran stem borers are of great economic importance in most maize growing countries throughout the world and are major constraints in its productivity. Pink stem borer, *Sesamia inferens* (Walker) is a serious pest limiting the production of maize in Rabi season. Hence in order to develop resistant desirable hybrids, pink stem borer tolerant inbred lines are urgently sought.

Morpho-agronomic characteristics: A set of inbred lines was evaluated for Leaf Injury Rating (LIR) in the scale of 1-9 in Rabi seasons (2009-10, 2010-11 and 2011-12) at Winter Nursery Centre, DMR, ANGRAU, Hyderabad. Based on least LIR of 2.0, the desirable lines were identified and evaluated for phenology and DUS traits. DMRE 63 (WNZPBTL 9) (IC0594373, INGR14014) is an early maturing inbred line resistant to pink stem borer (*Sesamia inferens*). The inbred line has wide leaf and tassel angle along with curved leaf attitude of blade, tassel attitude of lateral branches and sparse tassel. It has purple brace roots and anthers. However, tassel anthocyanin colouration of base of glumes, silk and leaf sheath are green in colour. The plant height, tassel length of main axis above lowest side branch and plant ear height are medium with narrow leaf width of blade, short ear length and small ear diameter. The ears are conical in shape and have medium number of yellow kernel rows with non-pigmented shank. It has straight kernel row arrangement, flint grains with round shape and small 1000-kernel weight of 154.2 g, respectively.

14. PS-1 (IC0598201; INGR14015), a Finger Millet (*Eleusine coracana*) Germplasm with Partial Sterility, Useful In Hybridization and Easy Maintenance

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15. PUNE SELECTION-3 (IC0599272; INGR14016), a Papaya (*Carica papaya*) Germplasm with Papaya Ring Spot Virus (PRSV) Tolerance and Higher Yields (30-40 Kg of Fruits)

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Pune Selection-3 a papaya line is having field tolerance to Papaya Ring Spot Virus (PRSV) and yields 30-40 Kg of fruits (Datar *et al.,* 2013; Anonymous, 2012, 2013). The parental material is a land race of papaya named Madhubala which was segregating. From this segregating population PS-3 was selected in the year 2009.Since then it was sibmated and pure line developed by selection at IARI, Regional Station Pune.

Morpho-agronomic Characteristics: Mean height of the plant is 1.96 meters, mean canopy E-W is 2.4 and N-S 2.15 meter, mean stem girth is 34.5 cms, leaf shape is palmate type, petiole colour is green. Days to flower 58-60. The line PS-3 is dioecious in nature with male or female flowers on separate plants. The percentage of plants with male flowers is 25-30. Petal colour in flowers is cream yellow. Height of the fruiting column is 1.1 meters. Mean number of fruits per plant is 25-30. Mean fruit weight is 1.5 Kg. Average yield per plant is 30-40 Kg/plant. Shape of the fruit is oblong with beak at styler end. Mean length of fruit is 24 cms while breadth is 16.5 cms. The flesh colour is pink to red with a TSS of 9-11.

Associated Characters and Cultivated Practices: The papaya line PS-3 is having field tolerance to Papaya Ring Spot Virus (PRSV) It shows mild PRSV symptoms at late stage. The incidence of PRSV in PS-3 and two checks Red Lady and Pusa Nanha over years is given in Table 1 and 2.

Table 1. Incidence of PRSV in PS-3, Red Lady and Pusa Nanha over years

Cultivar/line	February 2009	March 2009	February 2010	March 2011	April 2011	April 2012	Mean
PS-3	3.17	4.6	17.7	22.2	6.8	21.5	12.66 (6)
Red Lady	78.33	70.75	100	100	89.6	96.7	89.23 (6)
Pusa Nanha	17.18	–	33.33	–	38.6	39.2	32.07 (4)

Table 2. Yield of papaya fruits Kg./plant in PS-3 , Red Lady and Pusa Nanha over years

Cultivar/line	February 2009	March 2009	March 2011	April 2011	April 2012	Mean
PS-3	36.15	32.53	28.75	33.18	32.62	32.64
Red Lady	18.42	8.85	2.93	3.89	12.95	9.40
Pusa Nanha	22.84	–	–	25.51	0.0	16.11

Cultivation practices: Under Maharashtra conditions it is recommended to plant two months old seedlings in spring (Feb.-April) since the aphid vector population is minimum during Feb. to June. Seedlings should be raised in plastic bags in net house. Since PS-3 is a dioecious line two seedlings should be planted at a hill at one feet distance. Row to Row and plant to plant distance should be 2.1x 2.1 meters. Apply 10 Kg. Cow dung manure+2 Kg. Neem seed cake + 1 Kg. Sterameal per hill. Apply inorganic fertilizers like N, P, K 250g/plant in six splits at two months interval. Similarly spray micronutrients like $ZnSO_4$ 0.25-0.5% and Boron 0.1% at flowering and four weeks later.

References

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16. Creeping (IC0391661; INGR14017), a Mango (*Mangifera indica*) Germplasm with Medium Size Fruits, Yellow Coloured Fibreless Pulp, Good Sugar Acid Blend, Good Keeping Quality for Processing and Fruits with Red Blush on the Skin

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Mango is highly heterozygous and due to its propagation by seeds has resulted in extensive variability. There is a very large diversity for the monoembryonic varieties and in India about one thousand varieties are being grown. It is a chance seedling said to have originated in the Trichur region of Kerala (Naik and Gangolly, 1950).

Morpho-agronomic characteristics: It is a semi-vigorous tree having round shaped fruits with attractive yellow colour. It is a monoembryonic variety and the fruits are about 200-220g. The tree canopy is spreading type and the growth is mostly towards horizontal direction (Gangolly *et al.*, 1957; Anon, 1985; Iyer and Subramanyam 1986; Dinesh *et al.*, 2012).It is a regular and high yielder. The pulp is slightly fibrous towards the stone. However the fruits are not very sweet. It has a pulp recovery of >70%. The fruit characteristics are given Table 1.

Traits of interest: It can be used in the breeding programme for incorporating dwarf stature as well as good peel colour and high pulp recovery.

Barcode:

Table 1. Descriptor and descriptor state of IIHR 19977 (IC0391661)

Descriptor	Descriptor state
Tree size	Dwarf
Bearing behaviour	Regular
Leaf colour	Light brownish red
Leaf tip	Acuminate
Panicle colour	Greenish red
Panicle shape	Pyramidal
Yield (Kg/plant)	60-70
Fruit length (cm)	6.40
Fruit breadth (cm)	6.70
Fruit thickness (cm)	5.76
Skin colour	Yellow with red blush
TSS (°Brix)	13.20
Pulp content (%)	71.80
Pulp colour	Dark yellow
Stone weight (g)	16.60

References

Anon (1985) *Indian J. Hort.* **43:** 221-23.

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Dinesh MR, C Vasugi, KV Ravishankar and YTN Reddy (2012) Mango catalogue. Indian Institute of Horticultural Research, Bengaluru.

17. Kalapadi (IC0391736; INGR 14018), a Mango (*Mangifera indica*) Germplasm with Dwarf Stature, Produces Medium Sized Fruits Having Deep Yellow Coloured Pulp with High TSS and Good Keeping Quality

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The variety is indigenous to certain districts of Andhra state. The history of its origin and distribution is not known. It bears heavy crops regularly. In the coastal districts of Karnataka, the variety is known as Kallapady especially in the Dakshina Kannada districts. It is also known by the name KattiNeelum in the Tanjore district of Tamil Nadu (Naik and Gangolly, 1950).

Morpho-agronomic characteristics: The tree is dwarf statured but in some regions it is observed to be semi-vigorous. The fruits have very prominent lenticels. The young foliage is light brownish in colour. Fruits on ripening become pale yellow with green patches. The fruits are round in shape with a prominent beak. The pulp colour is pale yellow but firm and free from fibre. It has less pulp recovery but good keeping quality (Anon, 1985, 1988; Dinesh et al., 2012). The fruit characteristics are given in Table 1.

Traits of interest: It can be used in the breeding programme for incorporating dwarf stature, excellent fruit quality and good keeping quality.

Barcode:

Table 1. Descriptor and descriptor state of IIHR 342 (IC391736)

Descriptor	Descriptor state
Tree size	Dwarf
Bearing behaviour	Regular
Leaf colour	Light brownish red
Leaf tip	Acuminate
Panicle colour	Greenish red
Panicle shape	Pyramidal
Yield (kg/plant)	50-60
Fruit length (cm)	7.20
Fruit breadth (cm)	6.20
Fruit thickness (cm)	6.13
Fruit weight (g)	150
Peel colour	Greenish yellow
Pulp colour	Pale yellow
TSS (°Brix)	19.5
Pulp content (%)	31.90
Stone weight (g)	23.70

References

Anon. (1985, 1988) Reported at All India Coordinated Fruit Workshop.

Naik KC and SR Gangolly (1950) A monograph on classification and nomenclature of South Indian mangoes. Govt Press, Madras.

Dinesh MR, C Vasugi, KV Ravishankar and YTN Reddy (2012) Mango catalogue. Indian Institute of Horticultural Research, Bengaluru.

18. Janardha Pasand (IC0391715; INGR14019), a Mango (*Mangifera indica*) Germplasm Dwarf in Stature, Produces Medium Sized Fruits Having Yellow Coloured Pulp with High TSS, Good Keeping Quality with Attractive Red Blush All Over the Fruit

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The variety has originated in the East Godavari district of Andhra state. It is a late season variety and has good commercial value in the growing region. It is a regular bearing variety and fruits are borne in clusters (Naik and Gangolly, 1950).

Morpho-agronomic characteristics: This variety is a semi-vigorous tree type having sparse canopy. It is a medium yielder producing medium sized fruits. Fruits are borne in clusters of 2 to 3 fruits. The fruits are oval shaped and are not very sweet to taste. The fruits have thick peel and ripen to attractive red colour. It is one of the best indigenous varieties having excellent peel colour. The fruits taste is flat as the TSS is less and the pulp colour is yellow (Anon, 1982; Dinesh *et al*., 2012).

Traits of interest: It can be used in the breeding programme for incorporating dwarf stature, excellent peel colour and good keeping quality.

Barcode

Table 1. Descriptor and descriptor state of IIHR19962 (IC391715)

Descriptor	Descriptor state
Tree size	Semi-vigorous
Bearing behaviour	Regular
Leaf colour	Light green
Leaf tip	Acuminate
Panicle colour	Crimson
Panicle shape	Conical
Yield (Kg/plant)	45-50
Fruit length (cm)	8.90
Fruit breadth (cm)	6.60
Fruit thickness (cm)	6.63
Fruit weight (g)	256.20
Peel colour	Yellow with red blush
Pulp colour	Dark yellow
TSS (°Brix)	14.60
Pulp content (%)	67.50
Stone weight (g)	26.00

References

Anon (1982) Reported at All India Coordinated Fruit Workshop.

Dinesh MR, C Vasugi, KV Ravishankar and YTN Reddy (2012) Mango catalogue. Indian Institute of Horticultural Research, Bengaluru.

Naik KC and SR Gangolly (1950) A monograph on classification and nomenclature of South Indian Mangoes. Govt Press, Madras.

19. Ati Madhuram (IC0391622; INGR14020), a Mango (*Mangifera indica*) Germplasm with Medium Sized Round Shaped Fruits, Yellow Coloured Fibreless Pulp and Dwarf Stature

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The variety is grown in certain districts of Andhra state. The history of its origin and spread is not known (Naik and Gangolly, 1950). It produces fruits with very sweet taste.

Morpho-agronomic characteristics: It produces round shaped medium sized fruits. Tree has comparatively sparse canopy, when grown with enough moisture tree is vigorous. It is not a very regular bearer. Fruits are medium sized with fiber free pulp and very sweet taste. The pulp recovery is more than 60%. The fruits ripen to pale yellow colour (Anon, 2010; Dinesh *et al*., 2012) (Table 1).

Traits of interest: It has excellent firm pulp with high TSS and high pulp recovery.

Barcode

Table 1. Descriptor and descriptor state of IIHR19898 (IC391622)

Descriptor	Descriptor state
Tree size	Dwarf
Bearing behaviour	Irregular
Leaf colour	Light greenish brown
Leaf tip	Acuminate
Panicle colour	Light red
Panicle shape	Pyramidal
Yield (kg/ tree)	50-60
Fruit length (cm)	8.55
Fruit breadth (cm)	8.00
Fruit thickness (cm)	7.60
Fruit weight (g)	301.25
Peel colour	Yellow
Pulp colour	Yellow
TSS (°Brix)	21.40
Pulp content (%)	67.40
Stone weight (g)	34.60

References

Anonymous, (2010) UNEP-GEF report submitted to National Project Coordinator, India, Bioversity International Centre.

Naik KC and SR Gangolly (1950) A monograph on classification and nomenclature of South Indian Mangoes. Govt Press, Madras.

Dinesh MR, C Vasugi, KV Ravishankar and YTN Reddy (2012) Mango catalogue Published by Indian Institute of Horticultural Research, Bengaluru.

20. Kerala Dwarf (IC0391747; INGR14021), a Mango (*Mangifera indica*) Germplasm with Dwarf Stature, Medium Sized Round Shaped Fruits having Yellow Coloured Pulp

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It is a variety known to have originated in Trichur region of Kerala. Trees are very dwarf statured. It produces round shaped fruits of not very good quality.

Morpho-agronomic characteristics: It produces big sized fruits of about 400g. The young leaves are light green with brownish tinge. The fruits ripen to yellow colour with greenish patches. It does not bear regularly. The variety is ideally suited for high density planting. The pulp recovery is less because of bigger sized stone. Fruits are flat in taste with poor TSS (Naik and Gangolly, 1950; Anon, 1990-91; Dinesh *et al*., 2012) (Table 1)..

Barcode

Table 1. Descriptor and descriptor state of IIHR 20096 (IC391747)

Descriptor	Descriptor state
Tree size	Dwarf
Bearing behaviour	Irregular
Leaf colour	Light greenish brown
Leaf tip	Acuminate
Panicle colour	Dark red
Panicle shape	Pyramidal
Yield (kg/ tree)	20
Fruit length (cm)	9.40
Fruit breadth (cm)	9.50
Fruit thickness (cm)	9.30
Fruit weight (g)	437.50
Peel colour	Yellow
Pulp colour	Pale yellow
TSS (°Brix)	12.50
Pulp content (%)	57.80
Stone weight (g)	38.80

References

Anon (1990-91) Reported at All India Coordinated Fruit Workshop.

Naik KC and SR Gangolly (1950) A monograph on classification and nomenclature of South Indian Mangoes. Govt Press, Madras.

Dinesh MR, C Vasugi, KV Ravishankar and YTN Reddy (2012) Mango catalogue Published by Indian Institute of Horticultural Research.

21. Allahabad Safeda (IC0395191; INGR14022), a Guava (*Psidium guajava*) Germplasm with Medium Sized Fruits, White Coloured Pulp, High TSS, Good Keeping Quality and Soft

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It is a variety that is said to have originated in the Allahabad region. It is a semi-vigorous tree producing round shaped fruits. It is one of the main commercial varieties of guava grown in the country. It performs well in most of the guava growing regions.

Morpho-agronomic characteristics: The tree has smooth stem and it does not grow very tall. It produces round shaped fruits with high TSS, which ripen to pale green colour having smooth surface. Pulp is white in colour and seeds are soft. It is a heavy bearer having consistent pulp. The keeping quality of the fruits is good (Anon, 1985, 1989-90, 1990-91; Dinesh and Vasugi, 2010). It is amenable for high density planting (Table 1).

Traits of interest: Round shaped fruits having smooth surface, high TSS and soft seeds.

Table 1. Descriptor and descriptor state of IC0395191

Descriptor	Descriptor state
Tree size	Semi-vigorous
Bearing behaviour	Heavy
Fruit weight (g)	180-200
Yield/plant (kg) (8 to 10 yrs old)	70.0 to 80.0
Peel colour	Greenish yellow
Surface	Smooth
Pulp colour	White
Pulp consistency	Good
Hundred seed weight (g)	0.90
TSS (º Brix)	11.0
Acidity (%)	0.32
Pectin content (%)	0.81
Keeping quality	Good
Susceptibility to canker	Susceptible

Barcode

References

Anon (1985, 1989-90, 1990-91) Annual progress report of IIHR, Bengaluru.

Dinesh MR and C Vasugi (2010) Guava improvement in India and future needs. *J. Hortic. Sci.* **5:** 94-108.

22. Arka Mridula (IC0395190; INGR14023), a Guava (*Psidium guajava*) Germplasm with Medium Sized Fruits, White Coloured Pulp, High TSS, Good Keeping Quality and High Pectin

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It is selection from the open pollinated progenies of Allahabad Safeda. Fruits are similar to Allahabad Safeda with round shape. The Indian Institute of Horticultural Research released it in the early nineties. It is widely cultivated in Tamil Nadu and Karnataka.

Morpho-agronomic traits: It is a semi-vigorous tree having spreading habit. It is a heavy bearer having amenability for high density planting. It produces round shaped fruits with firm white pulp. Seeds are soft and chewable. The pulp is firm and the fruits on ripening become yellow. The surface of the fruits is smooth and it has good consistency. The TSS is high and acidity is low. It also has good keeping quality. It is rich in ascorbic acid content (Dinesh and Vasugi, 2010) (Table 1).

Traits of interest: Excellent quality fruit having high TSS, soft seeds and firm pulp.

Barcode

Table 1. Descriptor and descriptor state of IC0395190

Descriptor	Descriptor state
Tree size	Semi-vigorous
Bearing behaviour	Heavy
Fruit weight (g)	180-200 g
Yield/plant (kg) (8 to 10 yrs old)	70.0 to 80.0
Yield/ha (tons)	16-18
Peel colour	Yellow
Surface	Smooth
Pulp colour	White
Pulp consistency	Good
Hundred seed weight (g)	0.80
TSS (° Brix)	12.5
Acidity (%)	0.30
Ascorbic acid (mg/100g)	315.0
Pectin content (%)	0.81
Keeping quality	Good
Susceptibility to canker	Good

Reference

Dinesh MR and C Vasugi (2010) Guava improvement in India and future needs. *J. Hortic. Sci.* **5:** 94-108.

23. Red Flesh (IC0395219; INGR14024), a Guava (*Psidium guajava*) Germplasm with Medium Sized Fruits, Pink Coloured Pulp, High TSS, Good Keeping Quality

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It is a variety known to have originated in Uttar Pradesh. It is a vigorous tree having erect growing habit. Although not commercially extensively cultivated it is grown here and there in certain pockets of Andhra Pradesh, Tamil Nadu and Karnataka.

Morpho-agronomic characteristics: It produces oval shaped fruits having deep pink coloured pulp with hard seeds. It is heavy bearer producing small sized fruits. The peel colour on ripening becomes yellow with smooth surface. Pulp is firm and is not very sweet. However, fruits are also not acidic (Anon, 1985; Dinesh and Vasugi, 2010) (Table 1).

Table 1. Descriptor and descriptor state of IC0395219

Descriptor	Descriptor state
Tree size	Semi-vigorous
Bearing behaviour	Heavy
Fruit weight (g)	88-120 g
Yield/plant (kg) (8 to 10 yrs old)	60 to 70
Peel colour	Yellow
Surface	Smooth
Pulp consistency	Good
Pulp colour	Deep pink
Hundred seed weight (g)	1.20
TSS (º Brix)	10.0
Acidity (%)	0.25
Susceptabilityto canker	Susceptible

Traits of interest: Firm pulp having deep pink colour.

Barcode

References

Anon (1985) Annual progress report of IIHR, Bengaluru.

Dinesh MR and C Vasugi (2010) Guava improvement in India and future needs. *J. Hortic. Sci.* **5:** 94-108.

Erratum

The title published in Indian J. Plant Genet. Resourc.(2014) Vol 27(1): 69 was incorrectly cited. The correct title is as follows:

NSS-7809 (IC0283734; INGR13056), a Pearl Millet (*Pennisetum squamulatum*) Germplasm with Popping Traits

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Error is regeretted.