Indian J. Genet., **66**(2): 157-158 (2006)

Short Communication

Genotypic variability for weight, storage loss and germination of microtubers in potato (*Solanum tuberosum* L.)

V. P. Kale[1] and V. S. Kothekar

Department of Botany, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad 431 001

(Received: May 2005; Revised: May 2006; Accepted: May 2006)

The potato (*Solanum tuberosum* L.) is world's fourth important food crop after wheat, rice and maize. In potato production, the major input is of seed and approximately 50 % is the cost of seed potato. In addition to high cost of seed potato, potato production is characterized by low rate of multiplication. Potatoes are continuously propagated by tubers which is one of the most important disadvantages as all the tissue borne viruses, fungi and bacteria that have infected the crop during previous years leads to significant loss of yield and tuber quality. Now the microtubers production can be used as tool for production of nucleus potato seed stocks and has all the advantages of increasing pathogen free plants. In this case, the multiplication of virus free plantlets and microtuber production is carried out under aseptic conditions, where there is no chance of virus infection.

The seven genotypes *viz.*, MF-I, MF-II, TPS-7, TPS-13, TPS-67, JTH/C-107 and EX/A-680-16 composed the present study. The healthy, disease free tubers were obtained from CPRI, Shimla and planted in pots in glasshouse. After 3-4 weeks, the shoot tip and axillary node explants were taken for inoculation. The explants were first washed in running tap water in a detergent teepol, dipped in 70 % ethanol for 45 seconds and surface sterilized with 1 % sodium hypochloride for 5-7 minutes. Explants were finally washed thoroughly with sterile distilled water 3-4 times and inoculated on B_5 medium [1] supplemented with 0.25 mg/l BAP (Multiplication medium). The cultures were maintained at 25 ± 2°C and 75 % RH under the light (1600 lux from cool white fluorescent tubes). The plantlets were multiplied on solid multiplication medium through shoot tip and axillary node culture and elongated in liquid multiplication medium. After 3-4 weeks the multiplication medium was replaced by microtuber induction medium supplemented with four levels of BAP (6.00, 8.00, 10.00 and 12.00 mg/l) and two concentrations of sucrose (75 and 85 g/l). The cultures were stored at 18-20°C in dark for microtuber induction. The harvesting of microtubers was done after maturity, weight was recorded and stored at 4-6°C treatment-wise. After six months, the number of microtubers degenerated were recorded and expressed in percentage as storage loss. The microtubers were planted in nethouse for minituber production and percent germination was recorded after 30 days. Experiments were carried out in FCRD with three replications and data were subjected to statistical analysis [2]. Arc-sin transformation was used for percent storage loss and germination of microtubers.

The genotypes, sucrose concentrations and BAP levels had significant effect on three parameters of microtubers (Table 1). Weight, storage loss and germination of microtubers in seven genotypes, two sucrose concentrations and four BAP levels are given in Table 2. The genotypes differed significantly with mean weight from 0.41 to 1.00 gm. The genotype MF-II was significant over MF-I, TPS-7, TPS-67, JTH/C-107 and EX/A-680-16. The genotype TPS-7 was significant over MF-I, TPS-67, JTH/C-107 and EX/A-680-16. The genotype TPS-67 was significant over MF-I, JTH/C-107 and EX/A-680-16. The genotypes MF-I and EX/A-680-16 were at par with each other, while significant over JTH/C-107. The microtuber weight variation in genotypes is on record in potato [3,4]. More weight (0.61 g) was observed with 85 than 75 g/l sucrose (0.56 g). In BAP levels, maximum (0.68 g) and minimum (0.50 g) weight was observed with 10.00 and 12.00 mg/l, respectively. The sucrose concentration of 85 gm/1 and BAP level of 10.00 mg/1 were also found suitable for other parameters like microtuber initiation in potato [5].

Minimum (8.25 %) and maximum (13.00 %) storage loss was observed in genotypes MF-II and TPS-67, respectively. The genotype MF-II was significant

[1]Present address: Plant Tissue Culture Laboratory, Bejo Sheetal Seeds Pvt. Ltd., Jalna 431 203

Table 1. Analysis of variance (MSS) for three parameters of microtubers in potato

Source	df	Microtuber weight (g)	Storage loss of microtubers	Germination of microtubers
Genotypes	6	1.07*	53.51*	37.32*
Sucrose	1	0.10*	38.05*	169.20*
BAP	3	0.06*	97.35*	237.87*
Error	112	0.0004	1.70	11.16

(*Significant at 5%)

Table 2. Weight, storage loss and germination of microtubers in genotypes, sucrose concentrations and BAP levels in potato

	Microtuber weight (g)	Microtuber storage loss (%)	Microtuber germination (%)
Genotypes			
MF-I	0.44	10.25 (18.62)	96.50 (79.48)
MF-II	0.81	8.25 (16.53)	97.75 (82.10)
TPS-7	0.51	10.75 (19.10)	96.75 (79.79)
TPS-13	1.00	11.87 (20.12)	97.00 (80.25)
TPS-67	0.47	13.00 (21.08)	96.00 (78.68)
JTH/C-107	0.41	9.37 (17.77)	97.25 (81.23)
EX/A-680-16	0.43	11.25 (19.58)	96.12 (78.84)
SE ±	0.0039	0.27	0.68
CD (5%)	0.010	0.74	1.91
Sucrose (g/l)			
75	0.56	11.18 (19.45)	96.28 (79.05)
85	0.61	10.18 (18.50)	97.25 (81.06)
SE ±	0.002	0.14	0.36
CD (5%)	0.006	0.40	1.02
BAP (mg/l)			
6.00	0.57	11.50 (19.75)	96.78 (79.78)
8.00	0.60	9.36 (17.73)	96.64 (79.55)
10.00	0.68	9.28 (17.67)	98.28 (83.30)
12.00	0.50	12.57 (20.74)	95.36 (77.58)
SE ±	0.0029	0.20	0.51
CD (5%)	0.008	0.56	1.44

(Figures in parenthesis indicate arc-sin values)

over remaining six genotypes. The genotype JTH/C-107 was significant over MF-I, TPS-7, TPS-13, TPS-67 and EX/A-680-16. The genotype MF-I was significant over TPS-13, TPS-67 and EX/A-680-16, while at par with TPS-7. The genotype EX/A-680-16 was at par with TPS-13, while significant over TPS-67. The genotype TPS-13 was significant over TPS-67. Less storage loss (10.18 %) was observed with 85 compared to 75 g/l sucrose (11.18 %). In BAP levels, minimum (9.28 %) and maximum (12.57 %) storage loss was observed with 10.00 and 12.00 m/l, respectively. Maximum microtuber induction was observed with 85 g/l sucrose and 10.00 m/l BAP in potato [6].

Maximum (97.75 %) and minimum (96.00 %) germination could be recorded with genotypes MF-II and TPS-67, respectively. The genotypes MF-II, TPS-13 and JTH/C-107 were at par with each other. The genotype MF-II was significant over MF-I, TPS-7, TPS-67 and EX/A-680-16. The genotype JTH/C-107 was significant over TPS-67 and EX/A-680-16. The genotypes MF-1, TPS-7, TPS-67 and EX/A-680-16 were at par with each other. The sucrose concentration had significant effect on germination of microtubers and more germination (97.25 %) was observed with 85 g/l sucrose than 75 g/l sucrose (96.28 %). Maximum (98.25 %) and minimum (95.36 %) germination was observed with BAP levels of 10.00 and 12.00 mg/l, respectively.

Each microtuber had produced 3.67 to 6.67 tubers depending upon genotype. The weight of smallest tuber ranged from 2.33 to 7.67 g and that of biggest tuber from 19.67 to 96.33 g, which varied from genotype to genotype [6]. From the present investigation, it was concluded that genotype, sucrose and BAP had pronounced effect on weight, storage loss and germination of microtubers. Although, genotypes differed significantly maximum microtuber weight, less storage loss and more germination of microtubers were observed with specific BAP level and sucrose concentration indicating the suitability of protocols for broad range of genotypes. There is also need of extending this study in other genotypes and using this technology for commercial seed production in potato.

References

1. **Gamborg O. L., Miller R. A. and Ojima K.** 1968. Nutrient requirements of suspension cultures of soybean root cells. Exp. Cell Res., **50**: 151-58.
2. **Panse V. G. and Sukhatme P. V.** 1985. Statistical methods for agricultural workers. ICAR Publication, New Delhi. PP. 157-65.
3. **Chandra R., Chaudhari D. R. and Birhman R. K.** 1992c. Genotypic variability for microtubers production in potato. J. Ind. Pot. Assoc., **20**: 270-272.
4. **Randhawa G. J. and Chandra R.** 1990. *In vitro* tuberization in six Indian potato cultivars. J. Ind. Pot. Assoc., **17**: 199-201.
5. **Kale V. P. and Kothekar V. S.** 2004 Studies on microtuber initiation in potato (*Solanum tuberosum* L.). BIOINFOLET., 1: 10-12.
6. **Kale V. P. and Kothekar V. S.** 2004. Microtuber technology in potato: Biotechnological tool for quality seed production in nutritionally important food crop. *In*: Proceedings of the UGC sponsored National conference on Human Health and Nutrition: A Biotechnological Approach. 12-13 Dec. 2004. PP. 208-212. Thane, India.