

PERFORMANCE OF POTATO GENOTYPES FOR MORPHOLOGICAL PARAMETERS AND TUBER YIELD UNDER MALWA REGION OF MADHYA PRADESH

PRATIBHA KUSHWAHA, R.K.JAISWAL, N.K.GUPTA AND S.K.SHARMA

Department of Horticulture, RVSKVV, College of Agriculture, Indore - 452001 (M.P.)

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Potato (*Solanum tuberosum* L.) is one of the most important food /vegetable crops both in developed as well as in developing countries. Potato is fourth major food crop after rice, wheat and maize in the world. Now, it has become an essential part of breakfast, lunch and dinner worldwide (Ganga *et al.*, 2013). Potato occupies the top most position among tuber crops followed by cassava, sweet potato and yams. On the fresh weight basis, potato contains about 80 % water and 20 % dry matter. There Morphological characterization helps in identification of unique traits. Different genotypes differ in performance of morphological parameters and tuber yield of potato. With this in view, the present investigation on potato varieties was undertaken to study the morphological characters and tuber yield of potato under Malwa Region.

The experiment was conducted at Research farm, College of Agriculture, Indore (M.P.) during rabi season 2012 -13. Indore is situated in Malwa Plateau in western part of Madhya Pradesh on latitude of 22o 43' N and longitude of 75o66' E with an altitude of 555.5 meters above mean sea level, Indore region comes under sub-tropical and semi-arid region, having a temperature range from 29oC – 41oC as maximum and 7oC – 23oC as minimum in summer

and winter season, respectively. It is hottest during April and May while coolest in December and January. Relative humidity generally fluctuates between 30- 85 %. In this area, most of the rainfall is received during mid - June to early October, while winter rains are occasional and uncertain. The annual rainfall is 941mm. The south – west monsoon is responsible for the major precipitation. The soil of the experimental field was medium black clay (Vertisols) with uniform topography. The experiment was laid out in a randomized block design with seven varieties and replicated thrice. Healthy and pure seed tubers were used for planting (whole tubers) at 20 cm apart, in the shallow furrows at 60 cm distance and covered immediately after planting. FYM (20 t ha⁻¹) was applied at the time of planting. The dose of NPK (120, 80, 80 kg ha⁻¹) were applied through diammonium phosphate and muriate of potash, respectively. The remaining quantity of nitrogen was supplied through urea, after 35 days of sowing. For the various morphological characters five plants in each plot (leaving the two border rows and border plants in each plot) were selected randomly and were tagged to record the various growth observations and yield of potato tubers.

Table 1: Days to 50% germination, stems per tuber, plant height, leaves per plant, leaf area per plant, leaf area index (LAI), diameter of stem and yield of different varieties of potato

Varieties	Days to 50% germination (30 DAP)	Stems per tuber (30 DAP)	Plant Height (cm) 75 DAP	Leaves per plant 75 DAP	Leaf area per plant (cm ²) 75 DAP	Leaf area index (LAI) 75 DAP	Diameter of Stem (cm) 75 DAP	Yield (t ha ⁻¹)
Kufri Surya	20.7	3.40	38.1	16.9	402.04	0.335	4.07	31.33
Kufri Jyoti	20.7	5.07	42.7	15.4	395.39	0.329	4.16	29.16
Kufri Badshah	22.7	4.20	40.6	15.7	386.66	0.322	4.05	25.50
Kufri Sinduri	22.0	3.47	37.3	15.0	351.55	0.293	4.09	29.40
Kufri Chipsona-1	22.7	4.13	49.2	17.7	401.10	0.334	3.98	29.72
Kufri Chipsona-2	22.0	4.93	72.0	18.5	433.63	0.361	4.00	27.37
Kufri Chipsona-3	21.3	4.33	57.9	16.1	357.98	0.298	4.03	31.24
S Em±	0.5	0.31	2.81	0.65	14.22	0.012	0.09	1.14
C.D. (P=0.05)	NS	0.96	8.61	2.01	43.62	0.036	0.27	3.50

It is revealed from the data (Table 1) that the differences in days to 50 % germination were non-significant among varieties. The days required to 50 % germination was 20.67 in varieties Kufri Surya and Kufri Jyoti. In varieties Kufri Badshah and Kufri Chipsona-1, the required number of days for 50% germination were 22.67. The time for germination varies from variety to variety and physiologically older tubers emerged early as

compared to the younger ones (Tiwari and Tiwari, 1975). Significantly maximum number of stems per tuber were recorded in the variety Kufri Jyoti (5.07) While, the minimum in Kufri Sinduri (3.47). Out of three medium varieties Kufri Jyoti and out of four processing varieties Kufri Chipsona-2 (4.93) had shown the maximum number of stems per tuber. The number of stems produced per tuber is influenced by genetic composition, size of tubers as

well as environmental factors. These findings are in agreement with the results reported by Sharma *et al.* (1990) who found that large sized tubers produce more stems than of small sized tubers. The variety Kufri Chipsona-2 (72.0 cm) produced significantly taller plants as compared to rest of the varieties. The minimum plant height was observed in variety Kufri Sinduri (37.3 cm). Out of 3 medium varieties, Kufri Jyoti (42.7 cm) and out of four processing varieties, Kufri Chipsona-2 had shown the highest plant height. Variation in plant height was due to the inherent genetic makeup of the varieties, which is some way influenced this morphological expression expressed through the activity of endogenous growth regulators. Significantly maximum numbers of leaves were recorded in variety Kufri Chipsona-2 (18.5), while minimum in Kufri Sinduri (15.0). Out of three medium varieties Kufri Badshah (15.7) and out of four processing varieties Kufri Chipsona-2 (18.5) had shown the highest number of leaves. Probable reason for increased number of leaves may be due to increased rates of photosynthesis and photosynthates supply for maximum growth or change in endogenous auxin and nutrients in turn in apical dominance. Fernandes *et al.* (2010) reported that the exotic cultivars Asterix and Mondial of potato have more leaves per plant. Significantly maximum leaf area per plant was recorded in the Kufri Chipsona-2 (433.63 cm²), and minimum in Kufri Sinduri (351.55 cm²). Out of three medium varieties Kufri Jyoti (395.39 cm²) and out of four processing varieties Kufri Chipsona-2 had shown the maximum leaf area per plant. Variation in leaf area in potato crop was due to the inherent genetic makeup of the varieties. These findings are in agreement with the results reported by Geremew *et al.* (2007) reported that the climate, cultivar and crop management determine the growth of a potato crop. The development of leaves is important as they are

source of the photosynthate for the tuber formation. Significantly maximum leaf area index was recorded in the Kufri Chipsona-2 (0.361). While, the minimum 0.293 in Kufri Sinduri. Out of three medium varieties Kufri Jyoti (0.329) had shown the maximum leaf area index and out of four processing varieties Kufri Chipsona-2 had shown the maximum leaf area index. These findings are in agreement with the results reported by Shekhawat *et al.* (1999). Significantly maximum diameter of stem was observed under the variety Kufri Jyoti (4.16 cm). Whereas, the minimum in Kufri Chipsona-1 (3.98 cm). Out of three medium varieties Kufri Jyoti and out of four processing varieties Kufri Surya (4.07 cm) had shown the maximum diameter of stem.

Significantly maximum total yield was produced by Kufri Surya followed by Kufri Chipsona-3 and Kufri Chipsona-1 showed highest yield which are nearly at par with kufri Surya in yield. It is generally accepted that there is an inverse relationship between haulm and tuber growth. Such as, if haulm growth is encouraged by the application of early irrigation or fertilizer, especially N, tuber initiation is delayed. Vigorous stem and leaf growth lead to an appreciable delay in tuber formation. Mutombo *et al.* (1998) reported that the difference between environments and genotypes were significant for tuber yield and yield components. On the basis of present study, it can be concluded that out of seven varieties the Kufri Chipsona -2 showed significantly maximum plant height, number of leaves, leaf area and LAI. Kufri Jyoti showed significantly maximum number of stems per plant and diameter of stem. Significantly maximum total yield was produced by Kufri Surya in Malwa Plateau agro-climatic region of Madhya Pradesh.

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