Evaluation of Exotic Potato (*Solanum tuberosum* ssp. *tuberosum*) Germplasm in North-western Hills of India

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In North-western hills of India, potato is grown under temperate long-day condition of summer (April to September). Late blight is a serious problem in this region and under epiphytotic condition, yield loss can be as high as 90 percent. Resistance to late blight and high tuber yield are thus the major requirements of potato breeding in this region. Information on the nature and magnitude of variability of tuber yield, its components and resistance to late blight is a pre-requisite for an effective breeding program for hill region. For the improvement of a trait, the knowledge of genetic parameters, viz. coefficients of variation (GCV & PCV), heritability and genetic advance are important. The present study reports evaluation of 34 exotic germplasm accessions in order to identify potential parents for late blight resistance, high yield and to assess the nature and magnitude of genetic parameters of variability.

Ninety-eight accessions available in the germplasm repository of CPRI were evaluated (1-2 row trials/ accession) at CPRS Kufri (37°N, 77°E, 2500^{m} above sea level) in non-replicated row trials for 3 to 4 years. Based on the evaluation results of these accession in row trials, 32 accessions were found promising for either late blight or tuber yield or both (data not reported). The present experiment was conducted with 32 accessions for 2 years i.e. 2002-2003 & 2003-2004 with Kufri Jyoti and Kufri Giriraj as controls in randomized complete block design with three replications and a plot size of four rows of 10 tubers each. Plants were spaced 20 cm apart and 60 cm between rows. The crop was dehaulmed at 110 days after planting. Normal cultural practices were followed. However, no fungicide was sprayed for late blight in order to screen the accessions against this disease as suggested by (Dowley *et al.*, 1999).

Data on late blight incidence were recorded at three week interval. These values were used to compute area under disease progress curve (AUDPC) as per formula given by Shanner and Finney (1977). Accessions were grouped into classes based on AUDPC values viz., highly resistant (<30), resistant (31-100), moderately resistant (101-300) and susceptible (>300). At harvest, data were recorded on tuber number per plant, average tuber weight (g) and tuber yield (g/plant) at per plot basis. Data for both the years were analyzed separately. However, Bartlett's test indicated homogeneity of error variance and hence the results based on pooled analysis are presented for the characters except late blight since late blight did not appear during 2002-03.

Significant genotypic differences were observed for all the character studied. The genotype X year interaction was also significant for tuber number per plant, average tuber weight and tuber yield indicating that expression of these traits may vary from year to year. Six accessions were highly resistant to late blight, 23 were resistant, two were moderately resistant and three were susceptible. Mean, range, PCV, GCV, heritability and genetic advance for four characters are presented in Table 1. Variation was very high for AUDPC values while they were moderate to low for other characters studied. As expected PCV for all characters were higher than their corresponding GCV.

Heritability and genetic advance for all the characters followed the same trend as the genetic variation. High heritability coupled with high genetic advance for AUDPC

Table 1. Genetic parameters for yield and its components in potato

Characters	Mean ± SE	Range	PCV	GCV	Heritability (%)	Genetic advance (% of mean)	Correlation with tuber yield
Tuber number	4.59 ± 0.51	3.54 – 6.13	20.26	6.43	10.10	0.19	-0.20
Av. tuber weight	59.76 ± 7.44	39.77–103.24	30.04	20.90	48.40	17.91	0.72**
Tuber yield	261.74 ± 26.00	167.16–362.94	24.54	17.49	50.80	67.23	–
AUDPC	84.04 ± 31.58	19.30–489.42	134.48	126.33	88.30	205.48	-0.20

and tuber yield indicated that the direct selection would be highly effective for the improvement of these traits. On the other hand, little improvement would be possible for tuber number per plant. Average tuber weight had significantly positive correlation with tuber yield. Non-significant correlation was observed between yield and late blight. Previous studies also advocated selection of average tuber weight for achieving higher yields in potato (Maris, 1988).

Average performance pooled over two years showed that only six accessions CP Nos. 2038, 2063, 2070, 2076, 2083 and 2173 yielded significantly higher than the best control Kufri Giriraj. All of these accessions were resistant to late blight and had acceptable tuber shape, eye depth and uniformity. Ten most promising accessions w.r.t. tuber yield and late blight are presented in Table 2. These accessions could be used as potential parents in late blight potato breeding programme. These accessions, however, need to be tested in large-scale multi-location trial to pickup a few best for commercial cultivation.

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Table 2. The most promising accessions (10) for tuber yield and late blight resistance

Tuber yield per plant				AUDPC (ascending order)			
CPRI accession No.	Donor's culture/ variety name	Source country	Value	CPRI accession No.	Donor's culture/ variety name	Source country	Value
CP 2063	B-71-240.2	Peru	362.94	CP 2038	Arran victory	Peru	19.30
CP 2173	MS 82.60	Peru	358.21	CP 3290	Hope Hely	Hungary	19.50
CP 2083	Pimpernel	Netherlands	354.47	CP 2076	2070 (4)	UK	24.75
CP 2070	DTO-33	Peru	343.37	CP 2015	Tollocan	Mexico	24.75
CP 2038	Arran victory	Peru	339.81	CP 3171	Bzura	Poland	26.17
CP 2076	2070 (4)	UK	335.96	CP 3191	25/40	Peru	28.50
CP 3360	TPS- 113	Peru	325.99	CP 2113	Mexiquense	Peru	33.00
CP 2015	Tollocan	Mexico	307.19	CP 2378	Poos .16	Peru	33.00
CP 3171	Bzura	Poland	305.92	CP 2063	B-71-240.2	Peru	34.50
CP 3366	TPS-13	Peru	287.61	CP 2305	Primicia inta	Peru	36.00
K. Jyoti	–	India	206.27	K. Jyoti	–	India	489.42
K. Giriraj	–	India	279.58	K. Giriraj	–	India	47.25
$CD_{0.05}$	48.85	$CD_{0.05}$	63.08				

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Evaluation of Exotic Potato Germplasm for Foliage Maturity and Flowering Characters under Field and Glass House Conditions

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Flowering behaviour of various genotypes is important to make the desired cross of any genetic and breeding work. It is essential that the parental genotypes flower over a sufficient length of time and that the flower