International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(3): 854-862
www.biochemjournal.com
Received: 07-01-2024
Accepted: 11-02-2024

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Characteristics of genetic variability for yield and yield attributing traits in potato (*Solanum tuberosum* L.)

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DOI: https://doi.org/10.33545/26174693.2024.v8.i3j.844

Abstract
The current experiment titled "Characteristics of genetic variability for yield and yield attributing traits in potato (*Solanum tuberosum* L.)" was performed at Research cum Instructional Farm of Department of Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, (C.G.) during the rabi 2022-23. The twenty five potato genotypes including one check variety, i.e., AICRP P-79 planted in RCBD for the experiment. Genotypes were raised in three replications that were spaced 60 and 20 cm apart in four rows that were in this plot size (3 x 2.4 m^2). Total fifteen characters were used to record all observations where from each replication across all genotypes, five competitive well-grown plants at random had been chosen. Maximum PCV and GCV recorded for unmarketable tuber yield per plot, fresh weight of shoots per plot, number of branches per plant and fresh weight of shoots per plant. High heritability (bs) coupled with high genetic advance as % of mean had recorded at Fresh weight of shoots per plot (kg), total tuber yield per plot (kg), biological yield per plot (kg), number of branches per plant (kg), number of tuber per plant, fresh weight of shoots per plant (kg), harvest index (%), unmarketable tuber yield per plot (kg) and marketable tuber yield per plot (kg). Total tuber yield per plant attributes had highly significant and positive correlation with Plant emergence (%), number of shoots per plant, number of tuber per plant, number of compound leaf per plant and fresh weight of shoots per plot (kg). Path coefficient analysis revealed that Plant emergence (%), number of shoots per plant, number of leaflets per plant, fresh weight of shoots per plot (kg), number of tubers per plant, harvest index (%) and marketable tuber yield per plot (kg) had direct effect and correlation coefficient both are positive. It means correlation is due to direct effect, i.e. there is true relationship between dependent and independent traits, direct selection would be rewarding.

Keywords: Correlation coefficient, genetic variability, genetic advance, heritability, path coefficient

1. Introduction
Potato (*Solanum tuberosum* L., 2n = 4x = 48, autotetraploid) is annual plant belongs to nightshade family Solanaceae grown for its starchy edible tubers. The potato is native to Peruvian-Bolivian Andes. It was introduced in India by the Portuguese sailors during early 17th century and it's cultivation was spreads to north India by the British. It is known as "king of vegetables. it is a rich source of starch, vitamins (C, B6) and some essential amino acid like leucine, tryptophan, isoleucine. The area of potato in India is 2250 in million hectare, production 53687 in MT but in case of Chhattisgarh planted area 42.750 in hectare, production 614.056 in MT during 2020-21 (Anonymous, 2021) [1]. The potatoes with red, purple skins and/or fleshes originate from the accumulation of anthocyanins in the specific parts of different classes of pigments that is carotenoids and anthocyanins. Carotenoids produce white, yellow or saffron yellow colours of the skins and/or fleshes. Anthocyanins produce red, purple, blue or orange colours and different coloured potatoes. (Luthra *et al.* 2015b) [15].
Tuber yield is a complex character associated with many interrelated components. Therefore present study was carried out in order to find the characters that influenced the yield. Knowledge of morphological characters which have a genetic variation with tuber yield have between potato genotype is of great importance for its efficient utilization in breeding program. The genetic variability along with heritability gives reliable information of the genetic advance expected from population during selection for a character. Correlation coefficient reveals measure and direction of association of yield components while Path

coefficient analysis reveals whether the association of independent characters on dependent characters denotes yield is due to their direct effects or is a consequence of their indirect effects via other component characters. As a result, understanding the link between different qualities that have direct and indirect effects on yield is critical. It provide information about direct and indirect effects of independent variable on dependent variable.

2. Material and Methods

The experiment was conducted at Research cum Instructional farm of Department of Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh state located between 17˚ 14′ and 24˚ 45′ N latitude and 79˚16′ and 84˚15′ E longitudes whereas, Raipur lies at 21˚16′ N and 81˚36′ E with a height of 289.60 m above the mean sea level, India. The experiment consisting of 25 genotypes (including one checks) of potato. All genotype will be planted in Randomized Complete Block Design in 3 replications with plot size 3 x 2.4 sqm and 60 x 20 cm spacing rabi season during 2022-23. The data were collected on five randomly selected and tagged plants from each row. All standardized agronomic practices will be adopted to maintain the crop.

3. Results and Discussion

All observations were recorded for fifteen characters *viz.* plant emergence (%), plant height (cm), number of shoots per plant, number of branches per plant, number of total leaflets per plant per, number of compound leaves per plant, fresh weight of shoots per plant (kg), fresh weight of shoots per plot (kg), number of tubers per plant, biological yield per plot (kg), harvest index (%), marketable tuber yield per plot (kg), unmarketable tuber yield per plot (kg), total tuber yield per plot (kg) and total tuber yield per plant(kg).

3.1 Genetic Variability

3.1.1 Phenotypic and genotypic coefficient of variation

The coefficients of variation were measured at the genotypic and phenotypic levels and classified as low (less than 10%), moderate (10 to 20%) and high (more than 20%) given by Sivasubramanian and Madhavamenon (1973) [25]. The genotypic and phenotypic coefficient of variation related to the genotypes of potato and the check variety is AICRP P-79 have been determined for all of the fifteen traits presented in Table 3 and 4 respectively. Estimation of the genetic variability observed that high genotypic coefficient of variation in percentage (GCV%) was found in unmarketable tuber weight yield per plot (36.26%), number of branches per plant (24.85%), fresh weight of shoots per plot (22.47%) and fresh weight of shoots per plant (20.41%). The medium genotypic coefficient of variation percent (GCV%) observed in maximum characters. These characters are Total tuber yield per plot (19.04%), Marketable tuber yield per plot (16.77%), biological yield per plot (16.5%2), number of tuber per plant (16.49%), number of compound leaves per plant (14.72%), number of leaflet per plant (13.40%) and total tuber yield per plant (11.97%). The minimum genotypic coefficient of variation percentage observed in number of shoots per plant (9.81%), plant height (7.72%), harvest index (7.11%) and plant emergence (6.26%).

Genetic variability revealed high Phenotypic coefficient of variation percentage (PCV%) by unmarketable tuber yield per plot (38.50%), fresh weight of shoots per plot (22.63%), number of branches per plant (27.14%) and fresh weight of shoots per plant (20.95%). The moderate phenotypic coefficient of variation percentage (PCV%) showed by many characters which are total tuber yield per plot (19.33%), marketable tuber yield per plot (18.12%), number of shoots per plant (15.53%), number of leaflets per plants (16.65%), number of compound leaf per plant (16.61%), number of tuber per plant (18.01%) and biological yield per plot (16.86%). The low phenotypic coefficient of variation percentage (PCV%) showed by plant emergence (7.63%), plant height (9.88%) and harvest index (7.67%).

3.1.2 Heritability

Heritability is the ratio of observed phenotypic variation attributable to genetic variation. it is estimates along with genetic advance are normally more helpful in predicting the gain under selection than heritability estimated alone. However, it is not necessary that a character showing high heritability will also exhibit high genetic advance (Johnson, *et al*. 1955) [13]. Heritability is the heritable portion of phenotypic variance. The result of heritability is broadly grouped in low heritability (< 50%), moderate heritability (50% to 70%) and high heritability (> 70%). heritability as proposed by Robinson (1966) [20]. Evaluations of heritability in broad sense was calculated for all fifteen characters studied and presented in Table no. 2. High heritability showed by fresh weight of shoots per plot (98.56%), total tuber yield per plot (96.97%), biological yield per plot (95.99%), fresh weight of shoots per plant (94.89), unmarketable tuber yield per plot (88.72%), harvest index (85.81%), marketable tuber yield per plot (85.70%), number of branches per plant (83.83%), number of tuber per plant (83.81%), number of compound leaf per plant (78.55%). The moderate heritability was exhibited by plant emergence (67.27%), number of leaflets per plant (64.46%) and plant height (61.06%). The less heritability was exhibited by number of shoots per plant (39.93%) and total tuber yield per plant (48.42%).

All the characters showed that high to moderate heritability are least influenced by the environmental effects and can be useful in predicting the effectiveness of selecting the genotypes in population.

3.1.3 Genetic advance as a percentage of mean

Genetic advance as percentage of mean yield for tuber and it's elements as represented in Table no.2. Genetic advance as percentage of mean is useful for determining the genetic gains, which are likely to be secured in progeny. Genetic advance for % of mean was calculated by the formula given by Johnson *et al*. (1955) [13] was categorized as high (> 30 %), moderate (30 % to 10 %) and low (< 10 %). The high genetic advance as percentage of mean showing characters are number of compound leaf per plant (46.87%), number of tuber per plant (31.10%), fresh weight of shoots per plant (40.95%), fresh weight of shoots per plot (45.95%), biological yield per plot (33.34%), unmarketable tuber yield per plot (70.36%), marketable tuber yield per plot (31.98%), total tuber yield per plot (38.62%). The moderate genetic advance as percentage of mean showed by plant emergence (10.57%), plant height (12.43%), number of shoots per plant (12.78%), harvest index (13.56%) and total tuber yield per plant (17.15%).

The genetic advance as percentage of mean showing characters *viz*. marketable tuber yield per plot, number of compound leaves per plant, number of leaflets per plant, unmarketable tuber yield per plot, number of tubers per plant, fresh weight of shoots per plant, biological yield per plot, total tuber yield per plot, fresh weight of shoots per plot are important for breeder to consider these characters for selection.

3.1.4 Correlation coefficient

A statistical technique to measure the degree and direction of the correlation between two or more variables is the coefficient of correlation. In plant breeding, the correlation coefficient analysis examines the reciprocal relationships between various characteristics and identifies the selection criteria that would most likely lead to genetic improvement. The coefficient of correlation among tuber yield per plant and it's attributing character are showed in table 3 and 4. The result showed that tuber yield per plant exhibited a positive significant association at genotypic level with plant emergence (0.683), number of shoots per plant (0.684), number of branches per plant (0.463), number of total leaflets per plant (0.463), number of compound leaves per plant (0.581), fresh weight of shoots per plant (0.300.), fresh weight of shoots per plot (0.572), number of tubers per plant (0.655), biological yield per plot (0.357), harvest index (%) (0.247) and marketable tuber yield per plot (0.437). At phenotypic level tuber yield per plant exhibited positive significant correlation plant emergence (0.337), number of shoots per plant (0.223), number of branches per plant (0.246), number of total leaflets per plant (0.408), number of compound leaves per plant (0.357), fresh weight of shoots per plant (0.192), fresh weight of shoots per plot (0.405), number of tubers per plant (0.423), biological yield per plot (0.243), harvest index (%) (0.108), marketable tuber yield per plot (0.269) and total tuber yield per plot (0.380).

3.2 Path coefficient analysis

Simply dividing the correlation coefficient into direct and indirect effects, the standardized component regression coefficient is used to analyze a path coefficient. In other words, it assesses the direct and indirect effects of a number in independent characteristics on a dependent character. Using the method proposed by Dewey and Lu (1959) [8] Working in rice, Lenka and Mishra (1973) [14] have suggested scales for path coefficient analysis 0.00 to 0.09 (Negligible), 0.10 to 0.19 (Low), 0.20 to 0.29 (Moderate), 0.30 to 0.99 (High), > 1.00 (Very high). The result of path coefficient for tuber yield and its component are presented in Table no. 5. Plant emergence, number of shoots per plant, number of leaflets per plant, fresh weight of shoot per plot (kg), number of tubers per plant, harvest index (%), marketable tuber yield per plot (kg). traits had direct effect and correlation coefficient both are positive. It means correlation is due to direct effect, i.e. there is true relationship between dependent and independent traits, direct selection would be rewarding.

Table 1: Mean performance of potato genotypes for different yield attributing characters in potato

S. No.	Characters	Plant emergence (%)	Plant height (cm)	Number of shoots/plant	Number of branches/plant	Number of leaflets/plant	Number of compound leaf/plant	Number of tuber/plant	Fresh weight of shoots/plant (kg)	Fresh weight of shoots/plot (kg)	Biological yield/plot (kg)	Harvest index (%)	Unmarketable tuber weight yield/plot (kg)	Marketable tuber yield/plot (kg)	Total tuber yield/plot (kg)	Total tuber yield/plant (kg)
1	AICRP P-1	94.38	45	4.47	6.93	420.13	59.67	12	0.28	13.39	48	73.59	0.57	35.36	36.27	0.62
2	AICRP P-9	89.46	45.53	4	6	334.47	48.73	10.33	0.19	9.11	36.68	70.32	0.82	27	26.88	0.49
3	AICRP C-5	90	44.27	3.47	5.73	358	47.13	8.67	0.24	9.13	25.15	63.57	0.2	17.55	16.42	0.56
4	AICRP C-14	92.62	48	4.7	8.47	429.2	49.8	7.67	0.29	13.91	40.2	70.26	0.41	31.24	30.85	0.57
5	AICRP P-67	94.44	50.6	4.2	6.2	330.2	45.8	9.67	0.19	9.23	31.19	67.75	0.95	22.79	23.19	0.4
6	AICRP C-6	83.19	45.87	3.8	5.6	423.6	43.8	8	0.18	8.67	36.59	67.88	0.85	18.68	16.82	0.46
7	AICRP P-83	82.83	52.6	3.4	3.27	361.27	51.33	7.67	0.25	12.16	36.82	65.62	0.5	24.17	24.66	0.41
8	AICRP C-17	93.5	45.47	3.73	8.67	375.67	49	8	0.3	15.18	47.5	75.47	0.15	30.37	34.13	0.54
9	AICRP P-75	93.05	53.27	3.47	3.8	360.33	48.4	11.67	0.19	9.01	31.46	58.14	0.46	20.04	21.17	0.53
10	AICRP P-89	99.3	48.2	4.67	8.47	428	66.13	12.33	0.29	13.95	46.11	72.35	0.58	31.58	34.21	0.64
11	AICRP P-96	97.22	46.13	3.93	8.47	474.13	64.8	8	0.18	13.14	34.45	73.42	0.49	25.23	26.13	0.54
12	AICRP P-88	98.61	42	4.13	8.2	517.07	52.03	9.33	0.18	12.88	35.76	71.03	0.65	22.41	26.18	0.58
13	AICRP P-76	83.97	49.47	4	4.67	354.6	37.8	8	0.27	7.53	36.7	71.66	0.62	25.13	25.59	0.48
14	AICRP P-66	82.74	53.8	3.87	8.13	389	45.6	7.33	0.2	9.37	35.01	69.93	0.75	24.3	24.02	0.45
15	AICRP P-45	88.62	50.07	3.73	8.7	479.2	51.87	7.67	0.27	7.9	31.56	63.25	0.61	23.22	23.82	0.4
16	AICRP RH-2	90.71	47.4	4.07	4.93	400.4	38.33	8.67	0.19	8.86	25.77	65.53	0.91	21.26	22.5	0.56
17	AICRP C-15	97.91	50.13	3.87	8.13	469.93	61.2	10	0.28	13.55	28.74	73.88	0.25	27.17	27.32	0.61
18	AICRP P-90	96.53	50.73	4.87	9.13	517.2	56.07	9.33	0.28	13.2	33.87	70.87	0.93	24.76	25.11	0.57
19	AICRP P-73	97.22	51.67	4	9.07	556.93	62.6	10	0.28	13.26	30.73	67.02	0.54	20.61	21.73	0.58
20	AICRP P-81	80.59	39.4	4.33	5.07	375.4	51.2	8.67	0.25	12.19	32.13	61.43	0.82	20.74	20.53	0.49
21	AICRP P-82	80.53	44.07	4.47	5.2	398.4	44	10	0.15	7.23	38.79	63.01	0.79	24.45	25.83	0.62
22	AICRP P-14	84.53	50.4	3.27	7.4	372.33	43.87	11	0.19	9.23	38.98	62.21	0.83	23.64	25.57	0.55
23	AICRP P-93	83.6	44.2	4.57	5.93	389	44.27	11	0.2	9.58	32.69	60.8	0.45	21.44	20.55	0.46
24	AICRP P-95	93.86	38.93	5.13	8.07	468.4	59	12.33	0.29	13.87	40.39	61.82	0.75	23.82	25.94	0.66
25	AICRP P-79	93.05	50.2	4.8	8.4	428.93	46.73	11.67	0.29	14.05	40.29	62.33	0.95	23.5	26.7	0.54
	Mean	90.5	47.5	4.12	6.91	416.47	50.77	9.56	0.24	11.18	35.82	67.32	0.63	24.42	25.28	0.532
	Min	80.53	38.93	3.27	3.27	330.2	37.8	7.33	0.3	7.23	25.15	58.14	0.15	17.55	16.42	0.399
	Max	99.3	53.27	5.13	9.13	556.93	66.13	12.33	0.29	15.18	48	75.47	0.95	35.36	36.27	0.658

Table 2: Genetic parameters for tuber yield and its components in potato

Characters	Mean	Range		Heritability (%)	GA	GA% mean	GCV (%)	PCV (%)
		Min	Max					
Plant emergence (%)	90.50	80.53	99.30	67.27	9.57	10.57	6.26	7.63
Plant height (cm)	47.50	38.93	53.80	61.06	5.90	12.43	7.72	9.88
Number of shoots/plant	4.12	3.27	5.13	39.93	0.53	12.78	9.81	15.53
Number of branches/plant	6.91	3.27	9.13	83.83	3.24	46.87	24.85	27.14
Number of leaflets/plant	416.47	330.20	556.93	64.76	92.53	22.22	13.40	16.65
Number of compound leaf/plant	50.77	37.80	66.13	78.55	13.64	26.87	14.72	16.61
Number of tuber/plant	9.56	7.33	12.33	83.81	2.97	31.10	16.49	18.01
Fresh weight of shoots/plant (kg)	0.24	0.15	0.30	94.89	0.10	40.95	20.41	20.95
Fresh weight of shoots/plot (kg)	11.18	7.23	15.18	98.56	5.14	45.95	22.47	22.63
Biological yield/plot (kg)	35.82	25.15	48.00	95.99	11.94	33.34	16.52	16.86
Harvest index (%)	67.32	58.14	75.47	85.81	9.13	13.56	7.11	7.67
Unmarketable tuber weight yield/plot (kg)	0.63	0.15	0.95	88.72	0.44	70.36	36.26	38.50
Marketable tuber yield/plot (kg)	24.42	17.55	35.36	85.70	7.81	31.98	16.77	18.12
Total tuber yield/plot (kg)	25.28	16.42	36.27	96.97	9.76	38.62	19.04	19.33
total tuber yield/plant (kg)	0.53	0.40	0.66	48.42	0.09	17.15	11.97	17.20

Table 3: Genotypic correlation coefficient between tuber yield and its contributing traits in potato

Characters	Plant emergence (%)	Plant height (cm)	Number of shoots/plant	Number of branches/ plant	Number of leaflets/plant	Number of compound leaf/plant	Number of tuber/plant	Fresh weight of shoots/plant (kg)	Fresh weight of shoots/plot (kg)	Biological yield/plot (kg)	Harvest index (%)	Unmarketable tuber weight yield/plot (kg)	Marketable tuber yield/plot (kg)	Total tuber yield/plot (kg)	Total tuber yield/plant (kg)
Plant emergence (%)	1.000	0.012	0.297**	0.645**	0.632**	0.744**	0.350**	0.367**	0.681**	0.107	0.497**	-0.249*	0.387**	0.462**	0.683**
Plant height (cm)			-0.567**	0.038	-0.030	-0.094	-0.183	0.066	-0.179	-0.172	0.078	-0.004	0.043	-0.010	-0.409**
Number of shoots/plant				0.464**	0.421**	0.380**	0.513**	0.425**	0.519**	0.428**	0.062	0.414**	0.442**	0.402**	0.684**
Number of branches/plant					0.785**	0.588**	0.063	0.439**	0.602**	0.289*	0.453**	-0.080	0.395**	0.445**	0.463**
Number of leaflets/plant						0.690**	0.059	0.287*	0.521**	-0.025	0.269*	-0.030	0.028	0.104	0.463**
Number of compound leaf/plant							0.348**	0.454**	0.733**	0.234*	0.407**	-0.303**	0.433**	0.434**	0.581**
Number of tuber/plant								0.095	0.220	0.312**	-0.283*	0.165	0.183	0.268*	0.655**
Fresh weight of shoots/plant (kg)									0.649**	0.361**	0.283*	-0.339**	0.478**	0.470**	0.300**
Fresh weight of shoots/plot (kg)										0.455**	0.436**	-0.293**	0.511**	0.575**	0.572**
Biological yield/plot (kg)											0.378**	-0.027	0.779**	0.808**	0.357**
Harvest index (%)												-0.275*	0.680**	0.629**	0.247*
Unmarketable tuber weight yield/plot (kg)													-0.230*	-0.189	-0.171
Marketable tuber yield/plot (kg)														0.980**	0.437**
Total tuber yield/plot (kg)															0.494**
total tuber yield/plant (kg)															1.000

*,** significant 5% and 1%, respectively

Table 4: Phenotypic correlation coefficient between tuber yield and its contributing traits in potato.

Characters	Plant emergence (%)	Plant height (cm)	Number of shoots/plant	Number of branches/plant	Number of leaflets/plant	Number of compound leaf/plant	Number of tuber/plant	Fresh weight of shoots/plant (kg)	Fresh weight of shoots/plot (kg)	Biological yield/plot (kg)	Harvest index (%)	Unmarketable tuber weight yield/plot (kg)	Marketable tuber yield/plot (kg)	Total tuber yield/plot (kg)	Total tuber yield/plant (kg)
Plant emergence (%)	1.000	0.138	0.227*	0.546**	0.449**	0.566**	0.322**	0.306**	0.566**	0.064	0.398**	-0.196	0.255*	0.372**	0.337**
Plant height (cm)			-0.224	0.017	-0.044	-0.040	-0.115	0.049	-0.109	-0.145	0.064	0.022	-0.037	-0.018	-0.266*
Number of shoots/plant				0.247*	0.259*	0.128	0.309**	0.239*	0.302**	0.232*	0.034	0.260*	0.191	0.254*	0.223
Number of branches/plant					0.563**	0.499**	0.100	0.412**	0.553**	0.243*	0.391**	-0.081	0.319**	0.398**	0.246*
Number of leaflets/plant						0.512**	0.053	0.253*	0.427**	-0.045	0.134	0.006	0.026	0.086	0.408**
Number of compound leaf/plant							0.243*	0.381**	0.645**	0.215	0.306**	-0.271*	0.341**	0.368**	0.357**
Number of tuber/plant								0.115	0.202	0.288*	-0.238*	0.146	0.177	0.262*	0.423**
Fresh weight of shoots/plant (kg)									0.636**	0.338**	0.223	-0.303**	0.440**	0.453**	0.192
Fresh weight of shoots/plot (kg)										0.438**	0.399**	-0.269*	0.475**	0.561**	0.405**
Biological yield/plot (kg)											0.347**	-0.031	0.710**	0.780**	0.243*
Harvest index (%)												-0.250*	0.625**	0.582**	0.108
Unmarketable tuber weight yield/plot (kg)													-0.215	-0.189	-0.129
Marketable tuber yield/plot (kg)														0.923**	0.269*
Total tuber yield/plot (kg)															0.380**
total tuber yield/plant (kg)															1.000

Table 5: Path coefficient analysis showing the direct and indirect effect of yield contributing traits on the tuber yield of potato.

Characters	Plant emergence (%)	Plant height (cm)	Number of shoots/ plant	Number of branches/plant	Number of leaflets/plant	Number of compound leaf/plant	Number of tuber/plant	Fresh weight of shoots/plant (kg)	Fresh weight of shoots/plot (kg)	Biological yield/plot (kg)	Harvest index (%)	Unmarketable tuber weight yield/plot (kg)	Marketable tuber yield/plot (kg)	Total tuber yield/plot (kg)	total tuber yield/plant (kg)
Plant emergence (%)	0.1738	-0.0012	0.1225	-0.1315	0.4014	-0.4702	0.2571	-0.0794	0.1125	-0.0129	0.1362	0.1247	0.2129	-0.1628	0.683**
Plant height (cm)	0.0020	-0.1024	-0.2335	-0.0078	-0.0190	0.0593	-0.1343	-0.0142	-0.0296	0.0207	0.0213	0.0018	0.0235	0.0034	-0.409**
Number of shoots/plant	0.0517	0.0581	0.4117	-0.0946	0.2675	-0.2404	0.3773	-0.0921	0.0858	-0.0514	0.0169	-0.2078	0.2433	-0.1417	0.684**
Number of branches/plant	0.1121	-0.0039	0.1911	-0.2039	0.4987	-0.3715	0.0460	-0.0951	0.0995	-0.0347	0.1243	0.0400	0.2173	-0.1570	0.463**
Number of leaflets/plant	0.1098	0.0031	0.1734	-0.1600	0.6353	-0.4360	0.0436	-0.0621	0.0861	0.0031	0.0739	0.0149	0.0153	-0.0366	0.463**
Number of compound leaf/plant	0.1294	0.0096	0.1566	-0.1199	0.4383	-0.6319	0.2557	-0.0983	0.1212	-0.0281	0.1115	0.1517	0.2381	-0.1533	0.581**
Number of tuber/plant	0.0608	0.0187	0.2113	-0.0128	0.0376	-0.2197	0.7352	-0.0206	0.0364	-0.0375	-0.0777	-0.0827	0.1007	-0.0945	0.655**
Fresh weight of shoots/plant (kg)	0.0638	-0.0067	0.1751	-0.0896	0.1824	-0.2870	0.0700	-0.2164	0.1073	-0.0433	0.0774	0.1700	0.2626	-0.1659	0.300**
Fresh weight of shoots/plot (kg)	0.1184	0.0184	0.2137	-0.1227	0.3309	-0.4633	0.1619	-0.1404	0.1653	-0.0546	0.1194	0.1470	0.2809	-0.2027	0.572**
Biological yield/plot (kg)	0.0187	0.0177	0.1763	-0.0589	-0.0162	-0.1478	0.2297	-0.0782	0.0752	-0.1200	0.1037	0.0135	0.4282	-0.2850	0.357**
Harvest index (%)	0.0864	-0.0079	0.0254	-0.0924	0.1712	-0.2570	-0.2083	-0.0612	0.0720	-0.0454	0.2741	0.1381	0.3742	-0.2218	0.247*
Unmarketable tuber weight yield/plot (kg)	-0.0432	0.0004	0.1706	0.0163	-0.0189	0.1912	0.1212	0.0733	-0.0484	0.0032	-0.0755	-0.5015	-0.1267	0.0668	-0.171
Marketable tuber yield/plot (kg)	0.0673	-0.0044	0.1821	-0.0805	0.0176	-0.2735	0.1346	-0.1033	0.0844	-0.0934	0.1865	0.1156	0.5500	-0.3455	0.437**
Total tuber yield/plot (kg)	0.0803	0.0010	0.1654	-0.0907	0.0660	-0.2745	0.1970	-0.1018	0.0950	-0.0969	0.1724	0.0950	0.5387	-0.3527	0.494**
Residual – 0.0358 *,** significant 5% and 1%, respectively															

Conclusion

Analysis of variance shows all characters had higher range of significant variation among genotypes. It indicated that there is a lot of scope for selecting and exploiting various traits, in a crop improvement programme. Presence of higher phenotypic coefficient of variance (PCV) than genotypic coefficient of variance (GCV) for all the characters indicating that there may be some variation that is not only influenced by genotypes but also by a small amount of environmental factors. The difference between the values of PCV and GCV was low (<5%) for the majority of the traits except plant emergence (%) and total tuber yield per plant (kg). This suggested that most of the traits were less influenced by environmental factors. The high heritability coupled with high genetic advance was concluded that the selection of these traits may accumulate more additive genes leading to improvement of these characters. High heritability coupled with high genetic advance as percentage of means suggests that simple selection for such attributes may be efficient due to minimal environmental influence and heritability due to additive gene effect. In the present research, useful variation was observed between 25 genotypes for various characteristics suggesting that there is sufficient scope for selection and utilization in crop improvement programme. Characters which showed direct effect as well as positive correlation should be focused on as direct selection of these characters would be rewarding.

Acknowledgement

Research is creating new knowledge. Research needs the close co-operation of the friends and colleagues and the guidance of experts in the field to achieve something worthwhile with light patience, vigour and dedication of the person. These words are small acknowledgement but never fully recompensed for their great help and cooperation.

From the core of my heart which I owe to express my deep sense of gratitude towards chairman of my advisory committee, Dr. N. R. Rangare, Scientist, Department of Genetics and Plant Breeding, Indira Gandhi Krishi Vishwavidyalaya Raipur, Chhattisgarh. I have no words to express my heartfelt thanks to him for illuminating guidance; untiring supervision, constant encouragement, scholarly advice, constructive critic daughter, constant efforts and reflections have given a touch of excellence and formed an invaluable and previous part of this manuscript. My sincere thanks are due to Dr. Deepak Sharma, Professor and Head, Department of Genetics and Plant Breeding, for providing me research facilities, extremely useful help and valuable suggestion during my course of research work. I would like to express my sincere regard and heartfelt gratitude to respected teachers and members of advisory committee Dr. Alice Tirkey, Scientist, Department of Genetics and Plant Breeding, Dr. Prabha Rani Chaudhary Scientist, Department of Genetics and Plant Breeding, Dr. Ravi R. Saxena, Professor, Department of Statistics, Mathematics and Computer Science and Dr. Ashwarya Tandon, Scientist, Department of Plant Pathology, Raipur for their help and suggestions during the thesis work.

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