

Weightage score card for identification of new advanced hybrid of potatoes

SK Luthra, VK Gupta and Kamlesh Malik

Central Potato Research Institute, Regional Station, Modipruam, Meerut-250010, UP, India

In potato breeding, the major objective is to develop varieties with higher yields by overcoming various biotic and abiotic constraints, which limit the yield potential of varieties. Potato variety is a group of identical plants produced asexually from a single genotype and is devoid of heritable variation during its propagation. Plants of potato variety are homogenous because they are produced asexually, and heterozygous, because they originate from a heterozygous individual. In potato the integrity of genotype obtained following hybridization, is fixed in seedling stage and maintained with all its intra- and inter-locus interactions responsible for its phenotypic expression. If perceived desirable, it can be multiplied and advanced for commercial cultivation even though initially it may be present as a single plant.

More than 52 traits are required in ideal potato variety and it is perhaps an impossible task to combine all traits to obtain an ideal variety because of complex heterozygous nature of potato. An ideal potato variety affects not only yield and quality but also production cost, environmental issues (requirement of pesticides) and post-harvest losses (susceptibility to mechanical damage, dormancy or total weight losses during storage). Thus, identification of superior variety is dependent up on number of traits like yield, quality traits, resistance/tolerance to biotic/abiotic stresses and consumer acceptability etc. however all traits are not of same importance, therefore weightage score calculated by giving proper weight to different traits according to their relative importance become essential while comparing new advanced hybrid or variety in relation to existing variety of the region.

The new variety, should be superior to existing popular variety of the regions in at least one important characteristic, without being significantly inferior to it in any other important traits. Therefore, weightage score card for different purposes of potato breeding has been developed (**Table 1**), which enables to compare and judge a new advanced hybrid for introduction in All India Coordinated Research Project on Potato (AICRP-Potato) based on weightage score assigned to different characters as per their importance. For making valid comparison and judging the superiority of advanced hybrids over existing variety, total weightage of 100 is distributed between different desirable characters as per their relative importance. Major attributes, like tuber yield, resistance/tolerance to biotic/abiotic stresses and quality traits are major criteria in evaluating genotypes, therefore comparatively more weightage has been assigned to these characters in relation to other characters. The scoring for characters is done on 1 to 5 scale or 1 to 10 scale depending upon prevailing standards of the characters (**Table 1**). The total weightage scores obtained from different characters is thus used for comparing the new advanced hybrid with existing varieties and making its way for introduction/evaluation in AICRP-Potato.

Potato researchers may select and retain the category in the table and then insert two columns one each for advanced hybrid and control variety of the region. All relevant characters listed in rows should be retained and weightage score of the characters based on actual performance in investigation in respect to control variety and advanced hybrid may be filled. Thus this weightage score devised by assigning relative weights to different characters as per their importance would be helpful in judging the worthiness of advanced hybrid for introduction in AICRP-Potato or release of an advanced potato hybrids as new variety in comparison to existing variety of the region.

Table1. Weightage score for identification of new advanced hybrids of potatoes

S. No	Characters	Measurement/scale of characters	Weightage score to different purpose of potatoes					
			Table	Speciality	Processing	Late blight	Cyst nematode	Abiotic stresses
1	Foliage maturity	1 to 5 scale: 1-Very late, 2-Late, 3-Medium, 4-Early, 5-Very early	5	5	5	5	5	5
2	Tuber eye depth	1 to 5 scale: 1-Deep, 2-Medium-deep, 3-Medium, 4-Shallow, 5-Fleet	5	5	5	5	5	5
3	General impression	1 to 5 scale based on tuber shape/size uniformity and regularity: 1-Very low, 2-Low, 3-Medium, 4-High, 5-Very high	5	5	5	5	5	5
4	Dry matter	1 to 10 scale based on tuber dry matter content (%): 1-14%, 2-15%, 3-16%, 4-17%, 5-18%, 6-19%, 7-20%, 8-21%, 9-22%, 10- \geq 23%	10	10	10	10	10	10
5	Reducing sugar	1 to 5 scale based on reducing sugars (mg/100gram FTW): 0->250, 1-201 to 250, 2-151 to 200, 3-101 to 150, 4-51 to 100, 5- \leq 50			5			
6	Chips/French fry colour	1 to 5 scale: 1-very dark colour and 5 very light colour, Acceptable fry colour score limit: Chips up to 3 and French fries up to 4			5			
7	Dormancy period	1 to 5 scale based on dormancy period under on-farm storage up to 75 days: 1-Short (<6 weeks), 2-Medium (6-7 weeks), 3-Medium to long (7-8 weeks), 4-Long (>8-10 weeks), 5-Extremely long (>10 weeks)	5	5	5	5	5	5
8	Storage losses	1 to 10 scale based on total weight loss under on-farm storage up to 75 days: 0-Very poor (>25%), 2-Poor (21-25%), 4-Fair (16-20%), 6-Good (13-15%), 8-Very good (11-12%), 10- Excellent (\leq 10%)	10	10	10	10	10	10
9	Late blight resistance	1 to 10 scale (Based on AUDPC): 1-Highly susceptible (1201-1700), 2.5-Susceptible (651-1200), 5-Moderately resistant (351-650), 7.5-Resistant (250-350), 10-Highly resistant (<250)	15	15	15	20	15	15
10	Cyst nematode	1 to 10 scale based on reproduction factor (RF) value of cyst nematode: Immunity (RF = 0); Resistance (RF = < 1); Susceptibility (RF = > 1)					15	
11	Mite burn tolerance	1 to 5 scale based on burn (%): 1-Very high (>40% burn), 2-High (21-40% burn), 3-Medium (11-20% burn), 4-Low (6-10% burn), 5-Very low (0-5% burn)						5
12	Hopperburn tolerance	1 to 5 scale based on burn (%): 1-Very high (>40% burn), 2-High (21-40% burn), 3-Medium (11-20% burn), 4-Low (6-10% burn), 5-Very low (0-5% burn)						5
13	Tuber yield	1 marks for every 1% tuber yield increase over base yield of control variety: 10 or 15 or 20	30	20	20	25	20	20
14	Consumer acceptability	1 to 10 scale based on organoleptic test of boiled potatoes: 0-Poor-, 2.5-Fair, 5-Good, 7.5-Very good, 10-Excellent	10	10	10	10	10	10
15	Nutritional qualities	Based on contents of nutritional components		10				
16	Additional attributes	1 to 5 scale for other important traits not included in the category/purposes	5	5	5	5		5
Total weightage score			100	100	100	100	100	100