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Genetic purity assessment of wheat (*Triticum aestivum* L.) genotype through chemical test

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Abstract
The wheat varieties viz., AKW-381, AKW-1071, AKAW-3722, AKAW-2997.16, AKAW-4627, PDKV WASHIM, AKAW-4210-6 were grouped on the basis of chemical test Peroxidase test, NaOH (0.5%), KOH (0.5%), GA_3 (100 ppm) and 2-4 D (5 ppm). The study revealed that these tests could be effectively used for varietal characterization and determining the varietal purity of wheat in testing laboratories as the cultivars showed distinct response to these chemical test.

Keywords: Varieties, genetic purity, chemical test, wheat

Introduction
The present trend of continuous release of Wheat varieties from Central and State Varietal Release Committee has warranted developing techniques of varietal identification at the laboratory level particularly when the seed have been submitted for seed purity analysis. Maintenance of genetic purity of varieties is primary importance for preventing varietal deterioration during successive regeneration and for ensuring varietal performance at an expected level. The use of morphological traits in varietal identification and purity testing is time consuming and needs more area. Hence, there is a need for some quick tests for varietal purity testing in Wheat. The chemical tests reveal differences in seeds and seedlings different crop varieties (Agrawal, R.L. and Pawar, A, 1990) [1]. These tests do not much require virtually no technical expertise or training and can be completed in a relatively short time. The results of these tests are usually distinct, easily interpreted and help in grouping of the varieties. Therefore, an investigation has been carried out to study the response of wheat varieties to various chemical tests for effective utilization in varietal characterization and purity analysis.

Material and Methods
The experiment was carried out at Research Experimental field and Department of Genetics and Plant breeding laboratory, School of Agricultural sciences, G H Raisoni University, M.P. The following tests were conducted.

Peroxidase Test
The seed is soaked in water for 2 hours and seed coat is removed. The seed coat is placed in test tube and 3 to 4 cc of 0.5 per cent Guaycacol solution is added. One drop of 0.1 per cent H_2O_2 is added to this solution after 10 minutes. The solution changes to dark re/brown colour for a positive reaction or remains without colour for negative reaction. The reaction should be recorded within one minutes of adding H_2O solution (Buzzel and Buttery, 1969) [4].

NaOH Test
Three replicates of ten seeds each were soaked in 0.5 per cent NaOH solution for one hour and change in colour of the solution was observed. The varieties were grouped as Light brown, Dark brown and Straw colour based on colour of solution (Chakrabarty and Agarwal, 1989) [5].

KOH Test
Ten seed were soaked in 0.5 per cent KOH solution in three replicates for three hour and change in colour of the solution was observed. The varieties were grouped as Light brown, Dark brown and Straw colour (Chakrabarty and Agarwal, 1989) [5].

Seedling Growth Response to GA_3
Fifty seeds in each replication were soaked in 100 ppm GA_3 and germinated as per ISTA (1999) [7]. Observations were recorded on seedling length at 8th day. The percent increase in

seedling length over control was compared in each variety (Agarwal, R. L. and Pawar, A., 1990 and Lee *et al*. 1992) [1, 8].

Seedling Growth Response to 2, 4-D

Fifty seeds in each replication were soaked in 100 ppm GA_3 and germinated as per ISTA (1999). Observations were recorded on seedling length at 8th day. The percent decrease in seedling length was calculated (Lee *et al*. 1992) [8].

Results and Discussions

The varieties were classified on the basis of presence or absence of peroxidase activity. Varieties AKW-381, PDKV WASHIM and AKAW-4210-6 exhibited light and dark brown colour due to positive reaction (present) while in remaining varieties were colourless due to negative reaction (absent). The results are in conformity with the findings of Buzzell and Buttery (1969) [4]. Loverkovich *et al*. (1968) [9] suggested that peroxidase may play role in resistance of plant to infectious diseases. Agarwal and Pawar (1990) [1] reported that peroxidase activity can be used as a primary diagnostic character, in conjunction with other characteristics, to distinguish, the wheat varieties.

Colour reactions were obtained with 0.5 per cent of NaOH solution, with colour groups namely, straw colour. Straw colour varieties were AKW-381, AKW-1071, AKAW-3722, AKAW-2997.16, AKAW-4627, PDKV WASHIM, AKAW-4210-6 Similar results were reported by Takshashila (1986) in soybean: Chakrabarty Agarwal (1990) [6] in black gram: Biradar Patil *et al*. (2006) [2] in safflower and Suhasini (2006) [12] in sesame.

On the basis of colour reaction with potassium hydroxide solution, the wheat varieties were grouped as Light brown, Dark brown and Straw colour. Variety AKW-381, AKW-1071, AKAW-3722, AKAW-2997.16, AKAW-4627, PDKV WASHIM, AKAW-4210-6 Similar results were reported by Chakrabarty and Agarwal (1990) [6] in black gram: Biradar patil *et al*. (2006) [2] in safflower and Suhasini (2006) [12] in sesame.

On the basis of colour reaction with Gibberellic acid solution, the wheat varieties were grouped as Low, Medium and high response variety AKW-1071 Low response. AKW-381, AKAW-3722, AKAW-2997.16 and AKAW-4627 medium response and PDKV WASHIM and AKAW-4210-6 high response.

The effect of growth regulators and inhibitors on seedling growth behavior was used for the classification of soybean varieties (Chakrabarty and Agarwal, 1990) [6]. Seedling growth response to GA_3 (100 ppm) differed significantly with regards to seedling length, and grouped as high, medium and low responsive. The enhancement of seedling length due to exogenous application of GA3 showed considerable variation among the varieties. similar results were also recorded by Chakrabarty and Agarwal (1990) [6] and lee *et al*. (1990) in soybean.

On the basis of colour reaction with 2,4-D solution, the wheat varieties were grouped as susceptible and highly susceptible, variety AKW-1071, AKAW 3722, AKAW 2997.16 and PDKV WASHIM are susceptible and AKW 381, AKAW 4627 and AKAW 4210-6 highly susceptible.

The data on seedling growth response to 2, 4-D (5ppm) application interms of per cent decrease over control and classified into susceptible and highly susceptible. The application of 2, 4-D in general decreased the seedling length over control. Similar classification was done by Chakrabarty and Agarwal (1990) [6] in soybean and Shivakumar (2000) [11] in rape seeds. The differences in seedling growth in seedling growth reduction among the varieties might be due to differences in ethylene production due to the application of 2, 4-D (Sundaru *et al*., 1983) [13]

No single test contributes for successful identification. Hence, combination of these tests will be useful in characterization of wheat varieties. Thus, the chemical tests could be used as supplementary test for varietal characterization and determination of the varietal purity in wheat varieties since these tests are reliable, simple, quick and cost effective.

Table 1: Identification and grouping of wheat varieties through chemical tests

Varieties	Peroxidase test	NaOH test	KOH test	Gibberellic acid test		2, 4-D test	
				% increase over control	Group	% increase over control	Group
AKW-381	Light brown	Straw colour	No change	26.85	Medium response	68.57	Highly susceptible
AKW-1071	Absent	Straw colour	No change	24.57	Low response	52.58	Susceptible
AKAW-3722	Absent	Straw colour	No change	34.28	Medium response	57.46	Susceptible
AKAW-2997.16	Absent	Straw colour	No change	43.56	Medium response	57.40	Susceptible
AKAW-4627	Absent	Straw colour	No change	35.29	Medium response	70.58	Highly susceptible
PDKV WASHIM	Dark brown	Straw colour	No change	60.14	High response	56.53	Susceptible
AKAW-4210-6	Dark brown	Straw colour	No change	91.37	High response	59.10	Highly susceptible
Mean				41.31		70.76	
S.Em				0.34		0.40	
CD at 1%				1.36		1.60	

Note: GA3

Low response : < 25% increase over control
Medium response : 26 – 36% increase over control
High response : > 60% increase over control

Note 2, 4-D

Susceptible : 52-58% decrease over control
Highly susceptible : > 59% decrease over control

References

1. Agarwal RL, Pawar. Identification of soybean varieties based on seed and seedling characteristics. Seed Research. 1990; 18(1):77-81.
2. Biradarpatil NK, Sangeeta Macha, Motagi BN, Vijaykumar AG, Hanchinal RR. Characterization of safflower varieties through chemical tests. Abst. XII Nation. Seed Sem., 24-26 February, A N G R A U, Hyderabad, 2006, 168.
3. Buttery BJ, Buzzell RI. Peroxidase activity in seeds of soybean varieties. Crop Sci. 1968; 8:722-724.
4. Buzzell RI, Buttery R. Inheritance of peroxidase activity in soybean seed coats. Crop Sci. 1969; 9:387-383.

5. Chakrabarty SK, Agarwal RL. Identification of blach gram varieties I. Utilization of seed character. Seed Research. 1989; 17(1):23-28.
6. Chakrabarty SK, Agarwal RL. Identification of blach gram varieties III. Utilization of seedling growth response to added chemical. Seed Research. 1990; 17(1):23-28.
7. ISTA. International Rules for Seed Testing. Seed Science and Technology. 1999; 27:251-270.
8. Lee SC, Seo HI, Choi KG. Effect of seed size, temperature and GA treatment on hypocotyle elongation in soybean. Korean Journal Crop Science. 1992; 37(1):68-77
9. Loverkovich L, Loverkovich H, Stahmann MA. The importance of peroxidase in the wildfire diseases. Phytopath. 1968; 58:193-198.
10. Ravikumar. Identification of soybean varieties based on seed, seedling and plant characters. M. Sc. (Agri.) thesis, Univ. Agric. Sci.., Bangalore, Karnataka, (India), 1999.
11. Shivakumar. Characterization of rapeseed and mustard (Brassica spp.) cultivars using field and laboratory techniques. Seed Tech News. 2000; 31(1):31.
12. Suhasini KS. Characterisation of sesame genotypes through morphological, chemical and RAPD markers, M. Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad, Karnataka, 2006.
13. Sundaru M, Baba L, Tanabe T, Tamai F, Matoda Y. Varietal differences of Indonesian rice plants in their susceptibility to 2,4-D injury and inter-relationship with ethylene. Japaiese J Crop Sci. 1983; 52(3):323-330.
14. Takashashila N. Phenol colour reaction of seed integuments in rice. In Rice Genetics procedings of the Int. Rice Genet. Symp.. 27-31 May 1985, IRRI, 1986, 361-367.
15. Utpal Biswas. Eight different weed control treatment four different dosses of 2,4-D EE 38% EC (Nufarm) applied at 0.225, 0.450, 0.675 and 0.900 kg a.i. ha-1; with four other treatment, viz., 2, 4-D EE 38% EC (commercial) at 0.450 kg a.i. ha-1; metsulfuron methyl 20% WP at 0.004 kg a.i.ha-1; hand weeding twice at 25 and 45 DAS and unwedded control. THE experiment was laid out in a Randomized Block Design (RBD) replicated thrice, 2016.