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Identification of good Chapati quality wheat cultivar in Chhattisgarh through phenol test

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Abstract

The enzyme tyrosinase (Polyphenol oxidase) present in the outer layers of wheat grain react with the phenol and oxidize it to quinines which are subsequently converted to dark colored melanin's by polymerization & interaction with protein. Intensity of colour depends on the amount of tyrosinase enzyme. Tyrosinase activity is found to be an inherited characteristic for phenol test. Dark colour indicates high polyphenol oxidase activity which is not suitable for good chapatti quality. This technique also may be used in identifying mixture of wheat varieties.

The phenol test was carried out on 37 advanced fixed breeding lines which are selected according to their higher yield under different farming conditions. Depending upon the degree of darkness, score was given out of 10.0. The phenol colour reaction is also negatively correlated to with the darkening of the whole grain meal dough and chapatti quality. The entries which made good chapatti with > 8.0 score invariably developed very light brown color. This technique is simple and can be easily used in screening the genotypes for chapatti.

Cleaned grains free from damaged kernels or foreign material was kept in a petridish. Addition of 1% phenol solution was used to dip in the solution. Keep for 2 hours then drains out the solution and dried the seeds on a filter paper sheet. After complete drying, samples are grade the colour on the scale of 0-10. (Virendra Singh Sohu *et al.* 2018) Experiment was conducted in 3 replication. Score was mean over five observing individual Since different varieties develop different degree of darkness, total 32 genotypes including 5 checks *viz.*, HD 4730 (0), DBW 110(5.5), CG 1023 (2.5), SUJATA (4.2) & Chhattisgarh Genhu 4 (4.4) (*IWBR progress Report, 2016-17, Quality Vol. IV-55*) which had already known the scale of phenol test are taken for biochemical study. There are 16 genotypes *viz.*, CG 1710(4.5), CG 1702(1.2), CG 9103-2(2.2), CG-243-5(2.1), CG -8068-8 (3.5), CG -15-136-1 (3.9), CG 1035-4 (4.1), CG 1503(2.9), CG 8059-14-3(3.1), PYT-BSP-16-28(3.9), CG 1720(3.9), CG 1618(3.8), CG 1714(4.4), CG 9075(3.8), CG 1723(3.9) & CG-15-244-1(3.5) found excellent chapatti quality which have lower scale of phenol test as compare to all these checks.

Keywords: Wheat & phenol test

Introduction

Wheat (*Triticum spp.*) is one of the most popular cereals used in the world. An important problem for the flour and flour related products is their darkening and discoloration (Naqvi *et al.*, 2013) [5]. The Area & Production of wheat is increased from 2-3 years because the availability of good quality wheat varieties in Chhattisgarh. Many aspects of wheat quality, such as test weight, grain soundness, plumpness and moisture content, can be determined readily on the spot at the time of delivery. There is however, a second group of quality characteristics whose testing requires time and sophisticated equipment. These include milling quality, dough strength and extensibility, and baking quality. They are to a certain extent independent of environment, being defined characteristics of a cultivar. It is therefore desirable to have reliable methods of identifying wheat grain samples to cultivar. This need will be greater when Plant Breeders Rights are introduced (Coles & Wrigley, 1976) [1].

Wheat (*Triticum spp.*) is one of the most popular cereals used in the world. A important problem for flour and flour related products is their darkening and discoloration which is believed to result from polyphenol oxidase (PPO) activities. The enzyme tyrosinase (Polyphenol oxidase) present in the outer layers of wheat grain react with the phenol and oxidize it to quinones which are subsequently converted to dark colored melanines by polymerization and interaction with protein. Intensity of colour depends on the amount of tyrosinase enzyme. Tyrosinase activity is found to be an inherited characteristic (Sewa ram *et al.*, 2018) [3].

Material & Methods

The Experiment was carried out during *Rabi* season of 2017 at laboratory of Genetic & Plant breeding Department in Barrister Thakur Chhedilal College of Agriculture & Research Station,

IGKV, Bilaspur. The present study was planned with the objective to explore the possibility of its better chapatti quality through Phenol test. This test is basically used for testing of varietal purity qualitatively. Phenol colour reaction is also correlated to the darkening of the whole meal dough and chapatti quality. The colour of phenol reaction is negatively correlated to the chapatti quality. Screening of 32 advance fixed breeding line according to their higher yield under different farming conditions along with 5 checks varieties which have already known the scale of phenol test.

The Phenol reaction of the wheat genotypes was determined by soaking 15-20 grains of each sample in distilled water for 15-16 hours in petri plates. After that the water was drained off and 1 percent solution of phenol was added to the grains so that only three fourth of the grain is covered by the solution. The petriplates are covered and kept for 4 hours. After 4 hours the phenol solution is also drained off and the grains are dried of filter paper for 30 minutes. A subjective score (out of 10) is given to each variety based on the color after drying. Higher score will be given to the grains with darker intensity of the color (Satish kumar *et al*, 2018 & Wrigley, 1976)^[4, 1].

Result & Discussion

Wheat is the stable food for a huge proportion of world population. The wheat flour and other wheat products undergo time depending darkening/browning in appearance, which is undesirable for consumers (Morris & Rose, 1996). The changes in color are considered because of polyphenol oxidase enzymatic activity. The phenol test score ranged was observed from 1.2 to 6.4. The minimum score is found in genotype CG 1702 and maximum score is observed in CG-202-1. The genotypes CG 1702(1.2), CG 9103-2 (2.2) & CG-243-5(2.1) was found better than four checks *viz.*, DBW 110, Sujata, CG 1023 & Chattisgarh Genhu-4. The 10 genotypes CG 8068-8 (3.5), CG-15-136-1 (3.9), CG 1503(2.9), CG 8059-14-3(3.1), PYT-BSP-16-28 (3.9), CG 1720 (3.9), CG 1618 (3.9), CG 9075 (3.8), CG 1723 (3.9) & CG-15-244-1 (3.5) was found better than SUJATA, DBW 110 & Chattisgarh Genhu-4. The eight genotypes OS-LS-223 (5.5), CG 1710 (4.5), OS-15-202-2(5.2), CG 1609 (4.9), EIGN-16-82(5.1), PYT-DWR-14-5-B (5.5), CG 1715(5.1) & PYT-BSP-15-82(4.5) was found better than DBW 110 & Chattisgarh Genhu-4. The eight genotypes OS-LS-223 (5.5), CG 1710 (4.5), OS-15-202-2(5.2), CG 1609 (4.9), EIGN-16-82(5.1), PYT-DWR-14-5-B(5.5), CG 1715(5.1), OS-LS-627(4.4), CG 1714 (4.4) & PYT-BSP-15-82(4.5) was found better than DBW 110 & Chattisgarh Genhu-4.

Conclusion

On the basis of phenol test study CG 1710, CG 1702), CG 9103-2, CG-243-5, CG -8068-8, CG -15-136-1, CG 1035-4, CG 1503, CG 8059-14-3, PYT-BSP-16-28, CG 1720, CG 1618, CG 1714, CG 9075, CG 1723 & CG-15-244-1 found excellent chapatti quality.

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