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Short Note

Identification of Chilli Genotypes through Chemical Tests

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Investigations were carried out to study the varietal characterization of chilli varieties, CCH 1 hybrid and its parents through chemical tests with seeds. Potassium hydroxide and ferrous sulphate solutions were found to be useful for identification of female parent (Sln 1) of CCH 1 chilli hybrid and sodium hydroxide test was useful to differentiate PKM 1 chilli genotype. These chemical tests were first of its kind used in identifying chilli seed.

Key words: Chilli Genotypes, Chemical test, varietal identification, colour reaction.

Chilli (*Capsicum annuum* L.) a solanaceous vegetable, native to new world tropics and sub-tropics was introduced into India from Brazil. The world production is 70 L. T. from 15 L. Ha. with India, China, Pakistan occupying major acerage and India is the leader in production and consumption of chilli followed by Pakistan and China. Of late chilli varieties have been introduced both by public and private sectors due to importance of chilli in Indian cuisine underscoring the need for identification of a particular variety from other varieties, an essential component of plant variety protection. Many of the morphological traits possess multigenic expression which is altered by environmental factors. These limitations are overcome by rapid and reliable methods of varietal identification and genetic purity testing and the best alterative way to speed up the testing procedure is to use chemical tests which have not been attempted to group chilli genotypes so far. Chemicals have good scope in varietal identification and they are very quick, easy and reproducible (Reddy *et al*., 2008).

Materials and Methods

The seed material utilized for the present investigation comprised of TNAU released hybrids and varieties *viz*., CO1,CO2,PKM1, PMK1,PLR1, K1,K2,KKM1, hybrid CCH1 and its parental line (Sln 1x CA97). The chemical tests were carried out in the laboratory of Department of Seed Science and Technology, AC and RI, Madurai by following procedures:

Phenol test

Two replications of 50 seeds each were soaked in 50 ml of MilliQ water for 16 hours followed equi-spacing in petridishes containing filter paper moistened with 6 ml of Phenol solution (0.1%) and kept at ambient temperature. The seeds were examined for staining after 8 hours and 10 hours and grouped in to colour categories viz., light brown, dark brown or mars brown (Namarta *et al*., 2007).

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Modified phenol test

The standardized phenol test for varietal purity testing as suggested by Rimpi *et al*. (2008) with slight modification was followed. Two replications of 50 seeds each were soaked in 50 ml of 4% $CuSO_4$ for 16 hours and placed in petridishes lined with filter paper moistened using 4ml of Phenol solution (0.1%) and kept at ambient temperature. After 4 hours and 8 hours the seeds were examined for staining and graded based on color as light brown or deep olive, black, dark brown or mars brown colour (Reddy *et al*., 2008).

Potassium hydroxide test

Four replications of 50 seeds in each cultivar were soaked in 50 ml of 0.1 per cent potassium hydroxide and kept at room temperature for 5 hours. The solution was observed for deep- wine red staining (Vanangamudi *et al*., 1988).

Sodium hydroxide test

Four replications of 50 seeds of each genotype were soaked in 50 ml of 0.1 per cent solution of NaOH and kept at room temperature for 5 hours. The solution was observed for deep- wine red staining (Reddy *et al*., 2008).

Ferrous sulphate test

Four replications of 50 seeds of each genotype were soaked in 50 ml of 0.5 per cent $FeSO_4$ solution for 4 hours at 25^0C. Based on the seed colour development varieties were grouped as grey, light grey, dark grey and black (Bora *et al*., 2008).

Results and Discussion

The phenol and modified phenol tests did not stain different chilli genotypes rendering all genotypes undistinguishable and grouping was not possible (Table 1). The reason attributed for lack of phenol colour reaction may be due to the absence of Tyrosinase enzyme in seed coat or lack of highly specific and monogenically controlled response

Table 1. Categorization of chilli genotypes based seed coat colour change due to chemical tests

Chilli Variety / Hybrid	Phenol test	Modified phenol	KOH test	NaOH Test	$FeSO_4$ test
CO 2	No change	No change	Light yellow	Light yellow	No change
PLR 1	No change	No change	Light yellow	Light yellow	No change
PKM 1	No change	No change	Light yellow	Reddish yellow	No change
PMK 1	No change	No change	Light yellow	Light yellow	No change
K 1	No change	No change	Light yellow	Light yellow	No change
KKM 1	No change	No change	Light yellow	Light yellow	No change
CO 1	No change	No change	Light yellow	Light yellow	No change
K 2	No change	No change	Light yellow	Light yellow	No change
CA 97	No change	No change	Light yellow	Light yellow	No change
Sln 1	No change	No change	Reddish yellow	Light yellow	Black
CCH 1	No change	No change	Light yellow	Light yellow	No change

localized in seed coat. However several researchers have successfully used phenol and modified phenol test of differentiating seeds of cotton varieties (Ponnuswamy *et al*., 2003), rice (Janaiah *et al*., 2003; Sivasubramanian and Ramakrishnan,1974, Abrol and Uprety, 1972 and Kondo and Kasahara, 1940), in wheat (ISTA, 2004, Singhal and Prakash, 1989, Steen *et al*.,1986, and Walls,1965) and in cereals (Chakrabarty *et al*., 2007 and Csala, 1972).

Potassium hydroxide soaking led to varied colour reactions of seed soak solution and the genotypes were grouped as light yellow (CO1,CO2,PKM1, PMK1,PLR1, K1, K2, KKM1, hybrid CCH1 and male of CA 97) and reddish yellow (Sln 1). Among the genotypes KOH test was found to be useful for the differentiating the genotype of Sln 1 from the rest of the genotypes. Similarly, the sodium hydroxide soaking led to the genotypes being grouped as light yellow (CO1,CO2,PKM1, PMK1,PLR1, K1,K2,KKM1, hybrid CCH1, Sln 1 and CA 97) and reddish yellow (PKM 1). Here, the NaOH test was able to differentiate PKM 1 from the rest of the genotypes studied. Colour reaction of seed soak solution of both the chemicals may be due to inherent chemical difference or secondary metabolites present in the seed coat and may be a stable genetic character (Chakrabarty and Agarwal, 1989 and Khare *et al*., 2006). The ferrous sulphate test also could not differentiate among the genotypes except for Sln 1. Sln 1 seed solution turned black while other genotypes remained colourless. The results are in conformity with findings of Vashisht *et al*. (2011) in cotton for ferrous sulphate test was useful to testing the genetic purity of Vishwanath and Varalakshmi hybrids. The chilli genotypes did not show any significant response and colour pattern to phenol and modified phenol. However potassium hydroxide and ferrous sulphate tests were useful for identification of chilli genotype Sln 1 and sodium hydroxide for PKM 1 were found to be useful for identifying and grouping chilli genotypes.

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