

Combination of Chemical Tests and Kernel Morphological Traits Discriminated Variation among Durum Wheat Varieties

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[Introduction]

Many research findings have shown that the variation in response to chemical reaction of the aleurone layer of seeds is useful in differentiating or grouping of varieties. When seeds are exposed to certain chemicals, they develop a characteristic color depending on their chemical or metabolite constitutions. This color is a trait specific to a variety and the application of this property for the purpose of varietal characterization and identification has been well established in different crops. These chemical tests are simple to perform, quick and reproducible, relatively inexpensive, does not virtually require any specialized technical expertise. In this experiment, we have employed various simple and rapid chemical tests in conjunction with seed morphological characters for the identification of durum wheat varieties of Ethiopian origin.

[Materials and Methods]

Twenty durum wheat varieties were tested for various chemical assays viz., phenol, modified phenol, ferrous sulphate, potassium hydroxide and sodium hydroxide tests. Color reaction of the seeds to the chemical tests was used to discriminate the genotypes. Seed morphological traits such as seed shape, seed length, 1000 seed weight, seed pubescence etc were also helpful when the chemical tests are not sufficient to clearly identify the varieties individually. Three replicates having 20 seeds from each genotype were used to take measurements.

[Results and Discussions]

The color reactions of durum wheat varieties to various chemical tests were investigated. The test materials showed positive response to all chemical tests. Of the six chemical tests, standard phenol and modified phenol test stood first in discriminating the varieties. The modified phenol test intensified the chemical reaction response of standard phenol test and this was helpful to further distinguish 11 varieties which were undistinguishable by the standard phenol test. KOH and NaOH each had similar color reaction response and classified the varieties into two broad classes. Compared to the phenol test methods, these two assays were less efficient in the identification of varieties. Potassium iodide (KI) test was based on the staining of starchy endosperm. All varieties revealed a dark purplish color for the KI test. However, the proportion of seeds stained with the solution varied greatly among the varieties. FeSO₄ test classified the varieties in to 3 groups, each group containing several varieties. When all the above tests are combined, detailed classification of the varieties were obtained. Generally, the morphological characters contributed greatly to seed characterization. In some instances, they were instrumental in ascertaining the presence of genetic variation among varieties that have similar chemical reaction. These methods can be used for easy and rapid varietal identification under the basic laboratory setting.

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