

A New Color Test for Detecting Pongam (*Pongamia glabra*) Seed Oil

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Abstract

A rapid color test for the detection of 3% or more of pongam (*Pongamia glabra*) seed oil in other fats, based on the intense yellow to bright orange color which the oil gives on coming in contact with antimony trichloride, has been described.

Introduction

Pongam (*Pongamia glabra*) seed oil with its normal chemical and physical characteristics and fatty acid composition lends itself to facile admixture with other oils and fats. As the oil is not edible, its detection is of considerable interest to food industries. In the already existing method of detection applicable to pongam and other oils containing phenolic substances, the oil develops a light blue to dark violet color in alcoholic layer with alcoholic ferric chloride solution. A method which is specific for pongam oil is now described.

This method is applicable to pongam oil obtained either from screw press or solvent extraction. It is also applicable in the case of crude or alkali-refined, bleached or acid-refined pongam oil exclusively or when such oils are admixed with other oils and fats such as peanut, sesame, rice bran, soybean, safflower, rapeseed, mustard, castor, cottonseed, corn, linseed, watermelonseed, mahua, coconut, hydrogenated and sunflower and butter oils. The presence of vitamin A or moisture does not interfere with the test. Pongam oil, 5 g of which have been passed through 20 g of activated alumina and eluted with methanol-ether solvent mixture (25:975), also responds to the test.

Pongam oil gives an intense yellow to bright orange color in contact with antimony trichloride. There may be transparency, precipitate or turbidity along with the color.

Materials and Methods

Apparatus

Apparatus used are ordinary test tubes, 19 mm. inside diameter, 154 mm length; glass tubings ca. 6 mm outside diameter, 4 mm inside diameter to deliver ordinary size drops; pipets, Mohr, measuring type, 1 ml capacity; glazed porcelain tile with small cavities; and thin glass rods, ca. 2 to 3 mm diameter.

Reagents

(a) Twenty per cent (w/v) solution of antimony trichloride (A.R. quality) in chloroform (reagent quality). The reagent is prepared by weighing antimony trichloride crystals, adding to chloroform and shaking for a few minutes until the crystals dissolve.

(b) Light petroleum-like petroleum ether or normal hexane.

Procedure

This procedure is applicable to pongam oil exclusively or in admixture with other oils and fats.

Using Oil Sample in Solution. Take 1 ml of the given oil to be tested and dilute it to 20 ml with

petroleum-ether or normal hexane. Shake the solution for uniformity. The test should then be carried out on this solution by either of the following methods.

Spot Test Method

Place one to two drops of the sample on a glazed porcelain tile with the help of glass tubing.

Add one or two drops of the reagent to the sample by another glass tubing. An immediate characteristic canary yellow to bright orange color denotes the presence of pongam oil in the sample.

In the absence of chloroform solvent, add a small crystal of antimony trichloride to the sample on the porcelain tile and stir with the glass rod. An immediate characteristic canary yellow to bright orange color denotes the presence of pongam oil.

Test Tube Method

Take 0.5 to 1 ml sample in a test tube using a Mohr type measuring pipet.

Add equal volume of the reagent using a Mohr type measuring pipet. An immediate characteristic canary yellow to bright orange color indicates the presence of pongam oil in the sample.

When the oil sample is used as is, the following methods may be employed.

Drop Method

Take one drop of the oil sample in the test tube using glass tubing.

Add an equal amount of the reagent. An immediate characteristic canary yellow to bright orange color indicates the presence of pongam oil in the sample.

Ring Method

Take 1 to 2 ml of the reagent in a test tube using a Mohr type measuring pipet.

Add a drop of the oil sample through the sides of the test tube without shaking the contents. Note the coloration of the ring when the oil drop comes into contact with the reagent layer. An initial formation of an intense yellow to orange yellow ring indicates the presence of pongam oil in the sample. Then shake the contents of the test tube. An immediate characteristic canary yellow to bright orange yellow color indicates the presence of pongam oil in the sample.

Control

If a sample of peanut oil is to be tested for presence of pongam oil, the control test should be performed taking peanut oil of known purity under the same test conditions performed on the sample suspected of pongam oil admixture. If immediate canary yellow to bright orange color results, turbidity or precipitate will indicate the presence of pongam oil to the extent of 3% or above in the mixture. The gradation of color from canary yellow to bright orange depends upon the proportion of pongam oil

in the mixture. But even with the minimum detectable level indicated, the resulting color will be canary yellow for mixtures of other oils and pongam oil. On the other hand, pure oils (other than pongam oil) or their mixtures, give the same color as those of the oils themselves, i.e., pale yellow, brick red, brown or sometimes darkish. The canary yellow to bright orange color obtained as a result of the presence of pongam oil is striking and cannot be mistaken for a false positive test. Red palm oil and neem oil are exceptions (See Limitations).

Discussion

Sensitivity

The test gives reliable results with samples of oils and fats containing 5% or more of pongam oil. In the case of lighter-colored oils, the sensitivity of the method is such that the presence of even 3% (w/w) of pongam oil in the admixture can be detected.

Merits

The test is simple, rapid and reproducible. In addition, only a very small sized sample is enough to conduct the test. Thus, even if one drop of the oil sample is available, the test can be conducted.

The test checked well when tried independently in several other laboratories. Identical results were also obtained when the test was performed by different workers in the Institute.

Limitations

The test is not conclusive if pongam oil is admixed with red palm and neem (*Azadirachta indica*) oils as red palm oil gives a blue green color and neem oil gives an intense yellow color with the reagent.

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