Detection of Argemone Oil in Mustard Oil

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Abstract: In the present paper a new, very simple, rapid and economical qualitative technique is being reported. By means of this technique, adulteration of argemone oil in mustard oil can be detected. In the test, a small quantity of suspected oil successively treated with phenol and conc. sulphuric acid a deep red colour develops. Development of red colour in above test is due to formation of quinonoid compound and hydrolysed sanguinarine salt which indicates the presence of argemone oil as adulterant in test sample. Up to 0.05% argemone oil adulteration can be detected with the new technique.

Key words: adulteration, argemone oil, sanguinarine

1 Introduction

Dropsy is a dreaded disease caused by adulteration of Argemone mexicana seeds, which is obtained from yellow poppy plant with seeds resembling the mustard seeds (Brassica nigra) (Fig. 1). The seed of Argemone mexicana is a common adulterant of mustard seed either by chance or for profit making.

Argemone mexicana is an annual herb and naturalized throughout India. It is common weed in the agricultural and waste lands. The seeds are norcotic and emetic. They yield (~ 30%) yellowish brown oil, known as “Argemone oil” apparently looking like mustard oil with respect to colour odor and even specific gravity (1). The oil is non-edible and contains two alkaloids namely sanguinarine and dihydro-sanguinarine. Ingestion of argemone oil causes hypertension, glaucoma, dropsy, diarrhea, vomiting and anemia. The toxicity is attributed to the presence of the alkaloid sanguinarine, which is also carcinogenic. Recent trials have shown that the toxicity in the oil is due to the combined effect of sanguinarine and 11-oxotriacontanoic acids; the later

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adds to the toxic activity of sanguinarine (2).

No simple, rapid and reliable colour test is available in literature (3-6) for the detection/identification of argemone oil or its chief constituent, sanguinarine (I). In the present work, we have tried to develop a new simple and economical technique to identify Argemone oil when present alone in pure state and when present in mustard oil as an adulterant.

In the test when a small quantity of argemone-containing mustard oil is allowed to react successively with a phenol and conc. sulphuric acid, a deep red colour is developed. It has been observed by experimentation that the mustard oil does not give this reaction at all. The red colour of above test likely to be due to the formation of quinonoid ring and hydrolysed sanguinarine salt.

2 Experimental

Argemone seed was obtained from agricultural lands of Hardoi district, Uttar Pradesh (INDIA). Argemone oil was extracted by solvent extraction method, using n-hexane. The oil obtained was desolventised under vacuum. The yield of oil was 30%.

Take 2-3 drops of the oil in a dry test tube and mix successively with one drop of liquid phenol and 2-4 mL of conc. sulphuric acid and shake. A deep red colour develops within 10-20 seconds if argemone oil is present as adulterant.

3 Results and Discussion

First of all in above test dioxymethylene rings of sanguinarine hydrolyses in presence of conc. sulphuric acid to gives hydrolysed sanguinarine (II) and two moles of formaldehydes.

Now in the test, two moles of phenol react with one mole of formaldehyde in presence of conc. H$_2$SO$_4$ to produce phenol formaldehyde, which is condensed quinonoid red coloured dye (III). In the test deep red colour is formed due to formation of 1:1 addition complex of compound (II) and compound (III).

Down to 0.05% argemone oil adulteration can be detected with the help of above technique.

4 Conclusions

The above quick colour reaction give an opportunity of testing adulteration of argemone oil in mustard oil. The test has also been successful in checking adulteration of argemone oil in other oils.

References

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