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STUDIES ON THE PHYSICO-CHEMICAL CHARACTERISTICS, FATTY ACID COMPOSITION OF MESTA (*Hibiscus cannabinus* L.) SEED OIL AND ITS APPLICATION FOR THE PREPARATION OF DISINFECTANT LIQUID

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ABSTRACT

Akhter A, Hye MA, Khaleque MA, Islam MA, Rahman MM (2011) Studies on the physico-chemical characteristics, fatty acid composition of mesta (*Hibiscus cannabinus* L.) seed oil and its application for the preparation of disinfectant liquid. *Int. J. Expt. Agric.* 2(1), 27-29.

Mesta seed contains about 22.3% light yellow colored oil. The physico-chemical characteristics of the oil were determined by the conventional methods and the fatty acid compositions by GLC. The oil contains comparatively high percentage of unsaturated fatty acid, oleic (44.9%) and linoleic (26.7%) acid and higher saponificaiton value (192) which makes the oil very suitable for the preparation of disinfectant liquid. This disinfectant liquid was applied on bacteria and found effective results.

Key words: *mesta seed oil, physico-chemical characteristics, fatty acid composition and disinfectant liquid*

INTRODUCTION

Mesta (*Hibiscus cannabinus* L.) of family Malvaceae is an erect annual plant with prickly stem of a height of 8-12 ft. It is cultivated more or less in all the districts of Bangladesh and grows mixed with other crops. The plant is extensively cultivated for its fibre (Dymock 1890). Its seed contains about 22-25% golden yellow colored fatty oils (Tamiho *et al.* 2001). The oil is used in the manufacture of soaps especially hard soaps (Anonymous 1959). The oil contains higher amount of unsaturated fatty acid oleic (45.3%) and linoleic (23.4%) acid and having higher saponification value (192) (Anonymous 1959). This property makes the oil very suitable for preparing oil-based disinfectant liquid. Disinfectant is an organic phenolic compound and it acts as a germicide (Finar 1959). It can be used to kill germs and bacteria and to remove bad odour of toilets, drains, hospitals and surrounding places etc. (Narayan 1977). In the present work an effort was made to prepare disinfectant liquid using locally available non-conventional, un-used raw materials mesta seed oil.

MATERIALS AND METHODS

The experimental work has been done at BCSIR Laboratories, Rajshahi during the period 2008-2009. Ripe mature mesta seeds were collected, crushed and dried (4-6% moisture) and the seed oil was extracted in soxhlet apparatus using n-hexane as solvent for about 8 hours. The extracting solvent was removed by a rotary vacuum evaporator and the percentage of the oil was calculated. The specific gravity of the oil was determined at 28°C with the help of a pycnometer. Refractive index, moisture and volatile matters of the oil were determined by IUPAC method (Ali *et al.* 1996). The free fatty acid (FFA), saponificaion value, peroxide value and unsaponifiable matters in the oil were determined by the standard AOCS methods (Rafiquzzaman *et al.* 2006). Hanus method was followed to determine the iodine value of the oil (Rafiquzzaman *et al.* 2008). The fatty acid compositions were analysed as its methyl ester (Rahman *et al.* 2007). The physico-chemical properties of the prepared disinfectant liquid were measured. Antibacterial activity and MIC value of prepared disinfectant liquid was measured by FDA (Food and Drug Administration) method (Anonymous 1978).

PREPARATION OF DISINFECTANT LIQUID

600g rosin was melted in a stainless steel beaker at 75°C. 300g raw mesta seed oil was poured into it with stirring and heated to about 180°C. When profuse smoke evolves 480ml 25% sodium hydroxide solution was added and stirred till saponification was completed. Then 720ml soft water was slowly added and stirred until formation of jelly like mass. Then 1500ml creozote oil, 3g carbolic acid and 11.4 litres soft water were added with stirring to get a good emulsion. The product thus prepared was disinfectant liquid.

RESULTS AND DISCUSSION

The specific gravity and refractive index of the oil were normal in comparison with other vegetable oil like sesame oil (Mattil *et al.* 1964). The saponification and iodine value were noticeably high in the oil. The fatty acid component present in the oil mainly oleic (44.9%), linoleic (26.7%), palmitic (14.7%) and stearic acid (6.8%) which is more or less agree with the reported results of Chatfield (1953). The saponification value and the unsaturated fatty acid oleic and linoleic acid content of the oil are found to be high (Table 1). This property of the oil makes it very suitable for the preparation of disinfectant liquid. The physico-chemical properties of the prepared disinfectant liquid were shown in Table 2. The antibacterial activity and MIC values of the prepared disinfectant liquid were presented in Table 3. From Table 3 it is found that the gram negative bacteria were more sensitive than gram positive bacteria. In 150mg/disc gave strong inhibition against *Bacillus megaterium*, *Salmonella typhi* and *Shigella sonnei*. These results are comparable with the results of Mondal *et al.*(2006), who

reported that powerful phenyl preparing from petuli (*Trewia nudiflora* L.) seed oil were sensitive against gram positive and gram negative bacteria.

Table 1. Physico-chemical characteristics and the fatty acid compositions of mesta seed oil

Sl. No.	**Physico-chemical characteristics**	
1.	Percentage of the oil	22.3
2.	Moisture and volatile matters	5.2
3.	Specific gravity at 28°C	0.915
4.	Refractive index at 28°C	1.46
5.	Free fatty acid as oleic	2.10
6.	Acid value	4.17
7.	Saponification value	192
8.	Iodine value	98
9.	Unsaponifiable matter (%)	1.8
10.	Peroxide value	1.23
11.	Fatty acid compositions (wt%)	
	a. Oleic acid	44.9
	b. Linoleic acid	26.7
	c. Palmitic acid	14.7
	d. Stearic acid	6.8

Mean value of three experimental results

Table 2. Physico-chemical properties of prepared disinfectant liquid

Sl. No.	**Physico-chemical properties**	
1.	Colour	Reddish brown in colour
2.	Odour	Pungent smell
3.	Solubility	Soluble in water
4.	Nature	Basic in nature (pH=7.4)
5.	Density	0.9712 gm/cc
6.	Dilution ratio with water	1:50
7.	Shelf-life	3 years

Table 3. Antibacterial activity and MIC value of the prepared disinfectant liquid

Name of the Bacteria	**Diameter of zone of inhibition in millimetre (mm) Mean±SD**					**MIC value**
	30 µg/disc	60 µg/disc	90 µg/disc	120 µg/disc	150 µg/disc	Per 10^6 bacteria cell
Gram Positive						
1. *Bacellus megaterium*	51±1.50	60 ± 2.18	65± 2.65	75 ±2.63	90 ± 2.29	10
2. *Bacillus subtilis*	45 ±1.32	55 ± 2.78	62 ± 1.80	73 ± 2.74	83 ± 1.80	8
3. *Staphylo coccus aureus*	47 ± 2.64	53 ± 1.80	60 ± 2.78	71 ± 3.96	87 ± 2.78	10
4. *Sarcina lutea*	48 ± 3.27	55 ± 3.60	62 ± 4.58	72 ± 3.60	81 ± 4.36	9
Gram negative						
1.*Shigella dysenteriae*	45 ± 3.40	51 ± 3.04	60 ± 2.29	68 ± 3.80	85 ± 3.23	8
2. *Shigella boydii*	42 ± 2.16	56 ± 2.64	60 ± 3.60	70 ± 2.10	79 ± 3.28	10
3. *Salmonella typhi*	50 ± 2.95	61 ± 3.04	75 ± 3.02	86 ± 4.58	95 ± 3.60	8
4. *Shigella sonnei*	42 ± 3.04	59 ± 4.36	62 ± 1.80	73 ± 1.87	91 ± 2.64	8

CONCLUSION

Mesta seed contains about 22.5%, fatty oil can play a vital role in bridging the vegetable oil gap in the country as well as preparing oil-based product e.g., soaps, paints, varnishes etc. Our prepared disinfectant liquid using local, non-conventional raw materials can substitute synthetic phenyls. As it is herbal based it is more eco-friendly than synthetic one.

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