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# CHEMICAL ANALYSIS AND UTILIZATION OF 'KHAAR'

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## ABSTRACT

Samples of 'khaar' from different areas were analysed qualitatively and quantitatively. Sodium, potassium, calcium, magnesium, iron and silicone were found to be the major cations, while carbonate, sulphate and chloride were the major anions present in all the samples. Traces of zinc, molybdenum, copper, manganese, arsenic and boron were also found. A formulation consisting of 55% of water soluble part of 'khaar' 30% nansaw powder and 15% of trisodium phosphate, though did not give good lather but was found to be significantly equivalent to 'surf' in its detersive efficiency and was three times cheaper than 'surf'.

## INTRODUCTION

'Khaar' or 'sajji' is a product which is obtained by solidifying the thick liquid given out by burning the plant, *Suaeda fruticosa*, commonly called as 'lana'. Vast natural growths of this plant are found in Cholistan and Tharparkar deserts and to some extent in Baluchistan and Punjab. Presently, 'khaar' is used by villagers as a sheap soap substitute and in boilers where it checks scale formation and maintains pH.

In Pakistan, no survey has yet been made about the total area covered by *Suaeda fruticosa* or of the annual production of 'khaar' made from it. A number of workers have investigated the various aspects of *Suaeda fruticosa* (Shah, 1967; Al-Ani *et al.*, 1971) and other plants of the genus *Suaeda* (Rajpurohit and Son, 1978), but no studies have so far been reported on the chemical composition of 'Khaar' obtained from *Suaeda fruticosa* found in Pakistan. Keeping in view the economic importance of 'Khaar' it was planned to analyse it for its better exploitation.

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## MATERIALS AND METHODS

'Khaar' samples were procured from Faisalabad, Bahawalpur and Bhakkar districts and powdered to 60-100 mesh. Phy sical characteristics like colour, density, solubility, percentage loss on ignition and percentage moisture for all the samples were determined by standard methods (U.S.D.A., 1954). Qualitative analysis was carried out following Vogal (1962).

Sodium and potassium were determined using flame photometer (U.S.D.A., 1954), while calcium was estimated by titration, using ammonium perpurate as indicator (Chang and Bray, 1951). Calcium plus magnesium were petermined with EDTA using eriochrome black T indicator (Diehl *et al.*, 1950).

Carbonate and chloride were determined titrametrically (Reitomeier, 1943). Precipitation method (A.O.A.C., 1975) was employed for determining sulphate. Phosphorous was determined by colourimetric method after developing the colour with ammonium vanadate, ammonium molybdate and nitric acid (U.S.D.A., 1954). Iron was estimated by a colourimeter using orthophenanthrolene, ethanol and hydroxal amine hydrochloride as colouring rragent (Jackson, 1958). Silicon was estimated by simple difference method (U.S.D.A., 1954).

Water soluble portion of 'khaar' was prepared by leaching of whole powdered 'khaar' with boiling water and evaporating the filtrate to dryness. For formulation of soap substitute, different test detergent samples were prepared by mixing different quantities of water soluble portion of 'khaar' with different amounts of nansaw powder (an active constituent of synthetic commercial detergents) and a fixed quantity of trisodium phosphate (as dispersive). Each test detergent sample was tested for its lathering quality and detersive efficiency.

For lathering quality, one gram of the test detergent sample/'surf' was stirred for five minutes on a mechanical stirrer with 10 ml of water in a measuring cylinder and the volume of the lather formed was noted For detersive efficiency, a weighed quantity of dirty cloth was mechanically washed with a weighed quantity of test detergent sample/'surf'. The difference in weight before and after washing was taken to be proportional to detersive efficiency of

the test sample/'surf'.

## RESULTS AND DISCUSSION

It is apparent from Tables 1 and 2 that sodium is the major cation followed by potassium, calcium and magnesium in all 'khaar' samples. Most of the calcium is present in insoluble form in 'khaar' as it is clear from its contents in whole 'khaar, and water soluble portion. Amongst the anions, carbonate content is maximum in Bahawalpur sample and minimum in Faisalabad sample. Similar results have been reported by Shah (1967) and Al-Ani *et al.* (1971) who investigated the chemical composition of *Suaeda fruticosa* in relation to salinity.

Table 1. *Physical characteristics of 'khaar' samples*

| Samples obtained from | Colour | Density gm/ml at 23 °C | Solubility in $H_2O$ at 100 °C (%) | Loss on ingnition (%) | Moisture contents (%) |
|---|---|---|---|---|---|
| Faisalabad | Dark grey | 1.42 | 53.59 | 13.26 | 6.30 |
| Bahawalpur | Dark grey | 1.35 | 61.84 | 23.81 | 8.62 |
| Bhakkar | Light grey | 1.37 | 70.01 | 23.11 | 5.75 |

Regarding the formulation of a soap substitute based on 'khaar', the comparison of different test detergent samples with 'surf' revealed that the sample with 55% of water soluble part of 'khaar' 30% of nansaw powder and 15% trisodium phosphate was significantly equivalent to 'surf' in its detersive efficiency, but inferior to it in lathering quality. Costwise, the test detergent sample with the above mentioned composition was found to be three times cheaper than 'surf'.

In addition to the use of 'khaar' in making cheap detergent, it could also serve as a potential source of inorganic chemical used in glass, paper, leather and textile industries. It is suggested that this natural wealth if exploited properly at cottage industry scale, can raise the socio-economic status of the local people.

Table 2. *Percentage composition of 'khaar' samples and their water soluble part*

| Constituents | Whole 'khaar' sample | | | Water soluble part | | |
|---|---|---|---|---|---|---|
| | Faisal-abad | Bahawal-pur | Bhakkar | Faisal-abad | Bahawal-pur | Bhakkar |
| A. Major elements | | | | | | |
| Sodium | 18.00 | 26.63 | 18.00 | 28.54 | 30.52 | 25.25 |
| Potassium | 4.34 | 3.95 | 12.38 | 10.21 | 4.24 | 16.15 |
| Calcium | 3.86 | 4.38 | 5.04 | 0.18 | 0.15 | 0.15 |
| Magnesium | 2.60 | 3.91 | 3.47 | — | 0.08 | 0.02 |
| Silicon ($SiO_2$) | 12.97 | 5.30 | 5.14 | — | — | — |
| Iron ($Fe_2O_3$) | 7.01 | 5.32 | 5.01 | — | — | — |
| Carbonate | 18.08 | 31.47 | 31.50 | 28.12 | 50.34 | 40.39 |
| Sulphate | 18.60 | 5.22 | 5.20 | 17.73 | 4.05 | 10.01 |
| Chloride | 7.13 | 6.56 | 6.84 | 13.31 | 8.05 | 5.02 |
| Phosphate | 0.64 | 0.40 | 0.91 | 0.32 | 0.32 | 0.87 |
| B. Trace elements | | | | | | |
| | Zn, B, Cu, Mn, Mo | Zn, As, Mn, Cu | Zn, B, Cu, Mn | Zn, B, Cu, Mo | Zn, As, Cu, Mn | Zn, B, Cu, Mn |

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