acid, i.e., 3-hydroxy-p-toluic acid$^{6,7}$ (0.47 g); this too was further confirmed by the preparation of its acetyl derivative.

The neutral part (32 g) was chromatographed over neutral alumina grade II and three fractions were collected by eluting the column with petroleum ether, benzene and ether.

*Petroleum ether fraction*: (TLC five spots) of alumina on extensive chromatography over silicagel and silicagel impregnated with silver nitrate (15%) afforded *n*-tridecane$^{8}$ (3.5 g), decanone-4$^{9,10}$ (0.86 g) and octanone-3 (0.53 g)$^{11}$. All the three compounds have been identified on the basis of their physical, chemical and spectral data.

*Benzene fraction* (TLC, three spots): On extensive chromatography over active silicagel afforded two components, an aromatic ether (under investigation) and an ester, *p*-methoxy methyl cinnamate$^{12-13}$, m.p. 87-88$^\circ$.

*Ether fraction* (TLC, three spots): On extensive chromatography over active silica gel, afforded an open chain alcohol decanol-4. The structure has been confirmed on the basis of its physical, chemical and spectral data.

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boric acid and aluminium chloride, it was concluded that both the sugar residues are attached to the oxygen atom at the 7-position of the aglycone.

Further study concerning the sequence of attachment of the sugars and also the identification whether it is a rutinoside or a neoheesperidose is in progress.

Our thanks are due to Prof. S. Sankara Subramanian of the Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry-6, for the supply of authentic dinatin used for comparison and to the University Grants Commission, New Delhi, and the Madurai University for the award of a Research Scholarship to one of us (S. M. K.).

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EFFECT OF MINERAL NUTRITION ON YIELD AND OIL QUALITY OF SUNFLOWER

Experimental data on the effects of mineral nutrition on the yield and oil content of sunflower, a recently introduced oil seed crop, are available in literature\(^2\)\(^-\)\(^5\) but the role of mineral nutrient uptake on oil quality has not been studied. This aspect was investigated on a sandy loam soil at Agricultural College Farm, Bapatla, with two varieties of sunflower, viz., Sunrise and E.C. 68414.

The layout was a split-plot design, with the varieties being assigned to main plots and three dates of sowing combined with four levels of phosphate (0, 30, 60 and 90 kg P\(_2\)O\(_5\)/ha as superphosphate) being assigned to sub-plots; there were three replications. The crop received uniform dose of 60 kg N/ha as ammonium sulphate and 30 kg K\(_2\)O/ha as muriate of potash. In addition to the yield of seed, oil-yield was calculated from the per cent oil in seeds estimated with Soxhlet's extraction apparatus (A.O.A.C., 1970). Attributes of oil quality were determined by standard procedures.

Data on the maximum uptake of major nutrients N, P and K at complete flower-opening as well as yield and oil quality attributes are given in Table I.

The variety Sunrise gave significantly higher yields of seed and oil as compared to E.C. 68414. For both the varieties the uptake of K was highest followed by N and P, though there were no differences in the uptake of each nutrient between the two varieties. Similarly, there were no marked variations in the acid value, saponification value and iodine value of oil for the two varieties.

The relation between the uptake of N, P and K at complete flower-opening and the yield as well as oil quality attributes are given in Table II.

Uptake of N, P and K at complete flower-opening were significantly correlated with both seed and oil yields, those with oil-yield being still higher. The acid value and iodine value bore significant correlation with uptake of N and K only but not with that of P. Nutrient uptake did not seem to influence saponification value of oil. Saponification value which is indicative of the presence of long chain fatty acid components seems to be a characteristic

<table>
<thead>
<tr>
<th>Variety</th>
<th>Uptake of nutrients in mg per plant</th>
<th>Yield in kg/ha</th>
<th>Quality characteristics of oil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>P</td>
<td>K</td>
</tr>
<tr>
<td>---------</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>1. Sunrise</td>
<td>320·2</td>
<td>69·8</td>
<td>793·4</td>
</tr>
<tr>
<td>2. E.C. 68414</td>
<td>322·0</td>
<td>68·7</td>
<td>795·3</td>
</tr>
<tr>
<td>Significance</td>
<td>N.S.</td>
<td>N.S.</td>
<td>N.S.</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>..</td>
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</tr>
</tbody>
</table>

N.S. = Not significant.