V. SUMMARY

In continuation of the work of Swaminathan and Nataraja at the Indian Agricultural Research Institute, New Delhi on the chromosome breaking ability of some vegetable oils and edible fats, further experiments were conducted with ten commercial vegetable and mineral oils. Groundnut and castor oils were fractionated and were used in cytological studies. Standard 'Allium test' was carried out in Allium and Vicia root-tips with the different oils and fractions. Effects of the different fractions were also studied on tobacco seeds. A brief summary of the results is given below:

1. Morphological observations

Visible small tumours developed in the roots of the treated material. The extent of toxicity resulting in the inhibition of further growth of roots was found to vary in the different oils. Diesel oil and taramira oil showed the maximum toxicity to the normal growth of roots. As a result, the roots become too slack and turgorless, and even after keeping them for prolonged periods and tap-water for recovery, the turgor was not regained. Abnormalities such as bending, curling, narrowing and branching of roots were also observed during the growth of the affected roots.

2. Cytological observations

Stickiness, clumping, and sticky bridge formation were observed in all the treatments. The percentage of affected cells varied with the different oils at different recovery
periods. The effect was more widespread when the treatment was continued for 24 hours.

Chromosome and chromatid breaks, formation of minutes and rings, chromosome fragmentation and erosion, polyploid cells non-synchronisation in the anaphase movement of chromosomes dicentric bridges with fragments, reductional mitotic groups and various spindle abnormalities were recorded in the different treatments, at frequencies varying with the oil used. Oils also caused an extreme contraction of chromosomes, resulting in a good spreading.

3. effects of the fractions of groundnut and castor oil.

Since groundnut and castor oil were found to be the most effective in inducing various cytological aberrations. They were fractionated by suitable chemical methods and the cytological effects of the individual fractions were studied in Allium, Vicia, Nicotiana tabacum and Nicotiana rustica.

The fractions in the case of groundnut oil comprised of components of least soluble, intermediate and most soluble, mono-, di- and tri-saturated and unsaturated glycerides ranging in different proportions in the respective fractions. Castor oil fractions comprised chiefly of a glyceride tri-ricinolein.

In the 4 hours treatment the first fraction was found to be most effective, and in 24 hours treatment fractions 2, 3, 4 were effective, 3 and 4 being more potent than fraction 2. There was a complete inhibition of cell division and disintegration of cells in the 24 hours treatment with the 1st fraction indicating that it is more drastic in its effect than fractions 2, 3, and 4. In castor oil, however, both the fractions were
found to induce chromosomal changes.

In tobacco, *N. rustica* var. N.P.220, and *N. tabacum* var. K.49 were most susceptible to oil treatment, whereas *N. tabacum* var. Natu was very resistant and did not show any chromosomal changes. Thus, there was a pronounced varietal difference with regard to sensitivity to oil treatment.

4. **Effects of the rancid groundnut and castor oil fractions.**

In all rancid fractions the effect observed, if any, was mainly of a physiological nature i.e., the chromosomes invariably showed signs of slight to extreme stickiness. On the whole the rancid groundnut oil fractions were more toxic and produced a higher frequency of aberrations than the rancid castor oil fractions.

5. The data relating to the morphological, physiological, and cytological changes induced by the various oils, and fractions recorded during the present investigation, are discussed briefly in relation to similar or related work reported by other workers.

Some of the main points discussed are:-

(i) Probable mutagenic constituent of the oils;

(ii) Vegetable oils as mutagens and the possible implications of the findings on the role of vegetable oils as carcinogens;

(iii) The evolutionary significance of the occurrence of mutagenic substances in plant seeds; and

(iv) Radiations and radiomimetic chemicals.