LEAD CONTAMINATION OF SOILS AND ROADSIDE VEGETATION AT SELECTED SITES IN ISRAEL: PRELIMINARY SURVEY

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Lead is added to petroleum in the form of tetra-alkyl lead in order to improve the anti-knock properties of the fuel. The lead is removed from the engine via the exaust as lead di-halides which are dispersed into the surrounding environment.

Much work has been carried out in other countries to study the effect of lead emissions on the soils and vegetation adjacent to heavily travelled roads and highways. The preliminary study reported herein is being carried out to see whether or not the effects obtained in Israel are similar to those found abroad.

The lead content of ordinary leaded petrol may reach 0.45 gm/l. Legislation passed in Germany and the United States has attempted to lower the permissible lead content to 0.15 gm/l. It has recently been suggested (Dartnell, 1980) that the current tendency of lowering the lead content of petrol to prevent contamination of the environment leads to greatly increased costs in fuel consumption which outweigh any possible gain to society from the reduction in lead contamination.

Preliminary surveys were made in two areas of Israel with heavy traffic flows: 1. near Sho'eva in the Judean Hills on the main Tel-Aviv - Jerusalem highway, and 2. in the Tel-Aviv - Lod area on the coastal plain. Our results appear to show that the lead content of the soils is concentrated in the humus fraction, where the maximum concentration found reached 600 ppm. Plant tissues (oak and pine leaves) had maximum concentrations of up to 172 ppm lead.

In the Judean Hills area, soil contamination varies from 240 ppm lead at the roadside, drops to 40 ppm at a distance of 15 m, and reaches the background value of 20 ppm, 100 m from the verge or possibly sooner. Oak and pine leaves have lead contents of 100-170 ppm at the roadside but these drop to zero 100 m from the verge. Soil and humus sections show rapid depletion of the lead contents with depth.

The results obtained on the sandy soils of the coastal plain are completely different. On the Geha road (an area of extremely heavy traffic density) the soil lead concentration was only 10 ppm, with no apparent decrease with distance from the verge. Samplings at Mikve Yisrael and near Lod airport showed maximum lead concentrations of 25 ppm tailing off to 10 ppm at 100 m from the roadside. Results obtained in an orange grove near Beth Dagon show surprisingly low lead levels on the leaves (15 ppm), but also indicate a lead buildup in the soil.

These results apparently indicate that lead concentration in roadside soils is a factor of the humus content and also, possibly, of the mineralogical composition. Sandy soils with very little plant growth (e.g., Geha road, Lod airport) show very low lead values, whereas sandy soils with much plant growth (e.g., a field near Beth Dagon) show increasing concentrations. The clay-rich soils of the Judean Hills appear to absorb the lead emissions much more effectively than the sandy soil of the plain. The effect of vegetation as a lead absorber is shown by the high lead content of the humus examined.

The trend of the results obtained in this work tends to confirm the findings obtained in other countries, namely, that lead contamination due to traffic is confined to a narrow strip along the roadsides, and that the lead concentrations drop off to insignificant values within 100 m of the verge. No results are available for the lead contents of fruit or edible crops grown near highways or large urban concentrations and we hope to follow up this aspect in the future.

References

Dartnell, P., 1980. Lead in petrol, I: Energy conservation. *Chem. in Britain*, vol. 16, pp. 308-310.