# CHEMICAL EXAMINATION OF PLANT INSECTICIDES

## Part VIII. Pods of *Tephrosia lanceolata* Grah.

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PRELIMINARY trials with different parts of the plant *Tephrosia lanceolata* indicated that besides the roots (whose examination has been described in Parts VI and VII of this series[1, 2]) alcoholic extracts of the pods and flowers are also toxic to fish (pods: 134 p.p.m. in 50 minutes; flowers: 333 p.p.m. in 30 minutes). The results of a chemical study of the pods are described herein.

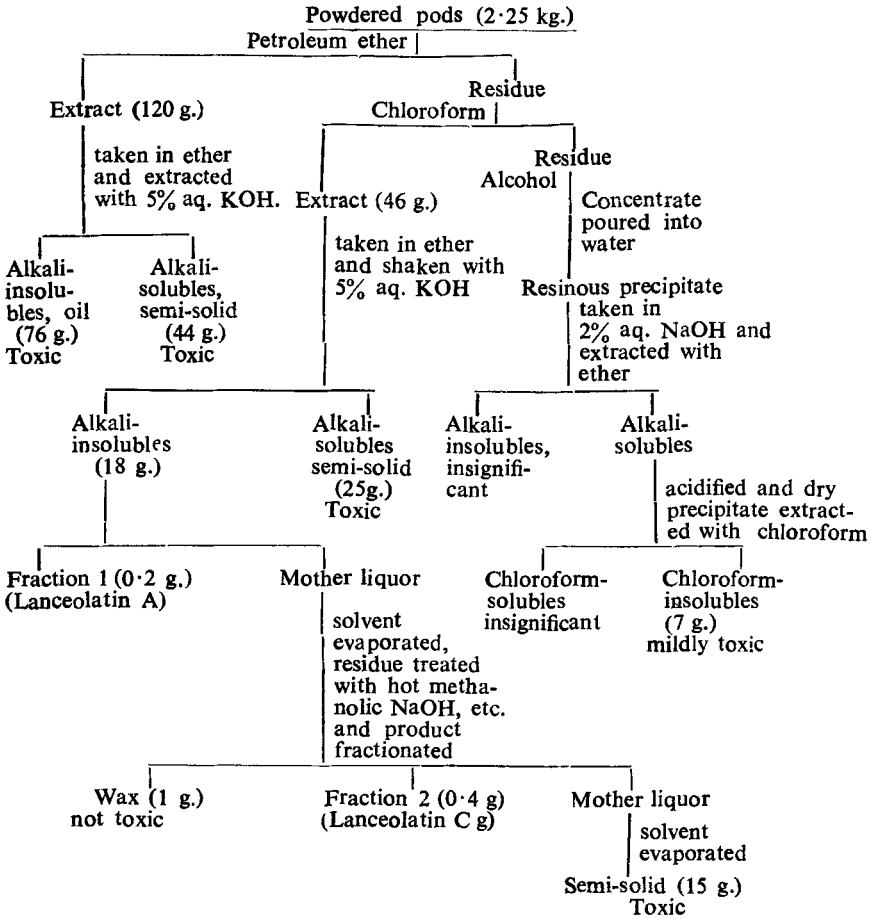
The pods were powdered and extracted successively with petroleum ether, chloroform and methylated spirit. No crystalline compound separated from the petroleum ether extract. Though pure rotenoids are almost insoluble in petroleum ether, the possibility of their dissolving in that solvent along with other amorphous substances is indicated by the work of Haller and LaForge[3] and Merz and Schmidt.[4] Hence in order to facilitate the separation of any crystalline components that might be present, the total petroleum ether extract was taken in ether and separated into alkali-soluble and alkali-insoluble portions by shaking with aq. potash. Though both fractions exhibited toxicity to fish (alkali-insolubles: 534 p.p.m. in 13 minutes; alkali-solubles: 150 p.p.m. in 3 hours), they did not yield crystalline components from any solvent.

The total chloroform extract was divided as usual into alkali-soluble and alkali-insoluble portions. The alkali-insoluble portion yielded only one crystalline component through direct crystallisation. This was found to be identical with Lanceolatin A (described under the name Substance I in Part VI[1]). The amorphous portion was subjected to treatment with boiling 1% methanolic sodium hydroxide (*cf.* Part VII[2]). The reaction product yielded crystalline Lanceolatin C (first described in Part VII), a non-toxic wax and a toxic semi-solid residue (49 p.p.m. in 12 minutes).

Crystalline Lanceolatin B which accompanies Lanceolatin A and C in the root-bark of *T. lanceolata* (see Parts VI and VII) could not be isolated from the pods.

The alkali-soluble part of the chloroform extract did not yield any crystalline component. It was toxic to fish (100 p.p.m. in 8 minutes).

The alcohol extract of the pods proved to be amorphous. It was soluble in alkali but insoluble in chloroform. Toxicity was feeble, 133 p.p.m. in 2½ hours. Boiling with aqueous or alcoholic KOH did not lead to the isolation of any crystalline substances.




## EXPERIMENTAL

Only the working up of the chloroform extract is described here in detail. The solvent-free extract (46 g.) was taken up in ether (500 c.c.) and shaken with 5% aqueous potassium hydroxide (4 × 50 c.c.). The ether solution was washed neutral, dried, filtered, concentrated and left in the ice-chest for a week. The crystalline solid that separated was filtered off (Fraction 1). The amorphous residue (17 g.) recovered from the mother liquors was taken

into 80 c.c. of methanol, treated with 20 c.c. of 5% aqueous sodium hydroxide and refluxed for 30 minutes. The reaction product was diluted with water, acidified with hydrochloric acid (congo red paper) and extracted with chloroform (3×50 c.c.). The residue obtained on removing the chloroform was treated with methanol (100 c.c.) and warmed to 50°. The heterogeneous mixture was transferred to a separating funnel while still warm. The lower oily layer was drawn off; on cooling it solidified to the consistency of a wax (1 g.). The methanol solution was filtered, concentrated to low volume and left in the ice-chest. The solid that separated (Fraction 2) was filtered and washed with a few c.c. of methanol. The mother liquor and washings yielded a semi-solid residue (15 g.) on evaporation.

*Fraction* 1 (0·2 *g.*).—Crystallisation from methylated spirit and then from methanol-acetone yielded pale yellow needles melting at 186–88°. Colour reactions were identical with those of Lanceolatin A and the mixed m.p. was undepressed.

*Fraction* 2 (0·4 *g.*).—Crystallisation from ether, methanol-acetone and finally from ethyl acetate yielded pale orange thick hexagonal plates melting at 128–29°. Colour reactions were the same as those of Lanceolatin C and the mixed m.p. was undepressed.

## Summary

The pods of *Tephrosia lanceolata* have been subjected to chemical study. The isolation of Lanceolatin A and Lanceolatin C (crystalline substances) in a very small yield and of a number of amorphous fractions, most of them toxic to fish, is described.

## References

1. Rangaswami and Sastry .. *Proc. Ind. Acad. Sci.*, 1952, **35A**, 162.
2. ———— .. *Ibid.*, 1953, **38A**, 13.
3. Haller and LaForge .. *J.A.C.S.*, 1934, **56**, 2415.
4. Merz and Schmidt .. *Arch. Pharm.*, 1935, **273**, 1; *Chem. Abs.*, 1935, 2533.