ABSTRACT

Neem (Azadirachta indica) which belongs to family Meliaceae has been identified as a promising natural insecticide. Azadirachtin a tetranortriterpenoid, has been identified as the most potent active ingredient in neem. Salannin another triterpenoid has also shown some potential in this respect. These compounds are concentrated in the seeds.

Studies were undertaken with a view to promoting local neem as a natural insecticide. Azadirachtin is difficult to synthesise, and isolation procedures are very tedious and low yielding. Therefore almost all studies to commercialize neem are based on crude neem extracts and not the pure compound.

Since azadirachtin is the most potent compound the level of azadirachtin in these extracts determines their effectiveness as insecticides. The reported HPLC method for estimating the levels of azadirachtin in crude neem seed extracts is costly, due to the expensive solvents required. Three TLC based techniques were developed for the rapid monitoring of azadirachtin on a semi-quantitative basis. However they were unsatisfactory for accurate determination, due to the large error involved in these methods. Therefore the existing HPLC technique was modified to quantify azadirachtin in local neem seed extracts.

The optimum conditions for storage of the crude neem extracts were studied. Results indicated that salannin is more susceptible to decomposition than azadirachtin under direct sunlight. When refrigerated these two compounds remained stable in amber coloured bottles for more than three months.

Laboratory processed neem products were analysed for their azadirachtin content. Neem oil was found to be unsuitable in insecticide formulations due to low levels of azadirachtin. However neem cake was found to be rich in azadirachtin and hence a better candidate for insecticidal formulations.

Commercial neem oil was found to be extensively adulterated with coconut oil. A simple GLC method was developed to determine the extent of adulteration. Commercial neem cake was also found to have low levels of azadirachtin. High expelling temperature with screw expellers, may have contributed to the degradation of azadirachtin. Fatty acid profile of the residual oil of the cake revealed the presence of considerable amount of coconut poonac in neem cake.

Neem cake showed very good potential as an animal feed. The protein content was high (40-45%) in the decorticated cake and it was well balanced in its amino acid composition except for lysine. Trypsin inhibitor activity as reported for indian neem cake was not detected in the cake.

An integrated scheme to process neem seed, with decortication and expelling the kernel at collection sites and processing the enriched cake at a central facility to produce insecticide formulations and animal feed is shown to have potential for commercial application.

Volatile consituents of neem were found to be rich in organosulphur compounds and the profiles were found to be similar to that of onions. cis and trans isomers of 3,5-diethyl-1,2,4-trithiolanes were identified for the first time in neem as the major compounds in the steam volatiles of neem kernel. It was shown that these compounds have been misidentified as n propyl 1-propenyl trisulphides in head space of neem and in many allium volatiles. A mechanistic explanation for the misidentification is also proposed. Based on these results an amendment to the existing bio-genetic scheme of Allium volatiles is proposed.