The Lupine: An Underexploited Plant

Sir:

Different varieties of lupines occur in Europe (*Lupinus albus* and *L. luteus*), in Africa (*L. termis*) and in South America (*L. mutabilis*). In Australia, yet another species (*L. angustifolius*) is being cultivated on a large scale.

For centuries lupine seeds have been used as human food, after the toxic alkaloids have been leached out with water, particularly in Egypt, the Sudan, Ecuador, Peru and Bolivia.

Plant breeders have produced "sweet lupines," i.e., varieties whose seeds are free of alkaloids (Rv. Sengbusch, *Landwirtsch. Jbb.* 91:723 [1942]). Sweet lupines are being grown on a large scale in Eastern Europe as well as in Australia and South Africa. In South America, where these plants are needed most, production has not increased, one reason being that varieties developed in Europe do not necessarily grow well elsewhere.

In 1975, the German Agency for Technical Cooperation (GTZ), Eschborn, started a program aimed at increasing the cultivation and utilization of lupines in the Andean regions of South America. Political responsibility for the German technical cooperation program lies with the Federal Ministry for Economic Cooperation (BMZ) in Bonn. Project proposals submitted by foreign governments through German embassies to the BMZ are evaluated by the GTZ. The BMZ commissions the GTZ to implement the project under its executive responsibilities in cooperation with the local partner. From that point, the developing country runs the project without further support. At present, 340 projects are staffed by GTZ personnel worldwide; another 210 projects are being implemented by subcontracted consultant companies.

A group working at the Institute de Nutrición in Lima, Peru, is headed by Dr. R. Gross, an agronomist. Together with their Peruvian colleagues, six German scientists in Lima and the Andean highlands are trying to further the cultivation of lupines, the development of procedures for the processing of lupine seeds and the use of both oil and protein as animal feed and human food.

The National Institutes of Health, Ministry of Health of Peru, in cooperation with the GTZ, organized the "1st International Lupine Workshop," which took place in Lima and Cuzco, Peru, April 12-21, 1980. More than 70 scientists from 15 countries attended. During four days, about 70 papers were presented; they were divided into seven sections: plant breeding, plant production, chemical characteristics of the seeds, food technology, animal nutrition, human nutrition and national activities in various countries. Toward the end of the workshop, the participants visited lupine fields at the Experimental Station of the University of Cuzco.

The following points summarize the results of the meeting.

Lupine

The lupine is a potentially valuable crop which requires little input. Currently, the plant is grown mainly in the Soviet Union (*L. albus, L. luteus*) and in Australia (*L. angustifolius*). Several Mediterranean countries, particularly Spain, and South American countries, such as Ecuador, Peru and Bolivia, are interested in extending acreage for the cultivation of lupines. The lupine is useful in erosion control and, as a typical legume, can be used to fertilize poor soils. In some countries, it serves as a forage crop.

The seeds of the local lupine species (*L. mutabilis*), "tarwi," contain 10-20% oil and up to 40% protein. Lupine oil, especially oil derived from this species, is rich in linoleic acid (~30%) but contains less linolenic acid (~3%) than soybean oil. The protein derived from lupine seeds has no leguminous taste. Because it is deficient in methionine, this essential amino acid should be added.

The alkaloids of "bitter" varieties can be washed out with water; if aqueous alcohols are used, detoxification is almost as complete, but less protein is lost. Moreover, the alkaloids extracted can be collected and do not contribute to environmental contamination. A pilot plant equipped by the GTX in Cañete, Peru, is detoxifying lupine seeds by extraction with 80% aqueous ethanol.

Plant breeders have developed some *L. mutabilis* lines having fairly low levels of alkaloids. Thus it can be expected that, in the years to come, the bitter lupines will be largely replaced by "sweet" varieties.

The proceedings of the 1st International Lupine Workshop will be published in a book.

In order to maintain and to intensify the contacts established during the workshop in Peru, the participants decided to publish a *Newsletter*. The Spanish delegation proposed to organize the 2nd International Lupine Workshop in Spain. Their invitation was enthusiastically welcomed.

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