

## THE CULTIVATION OF HENBANE.\*

BY N. R. MUELLER.

During the past three years much attention has been given to the commercial growing of Solanaceous plants containing mydriatic alkaloids. Of course belladonna and stramonium have been produced in increasing quantities, but it is apparent that the cultivation of henbane offers several problems which differ materially from those encountered in the handling of either of the first mentioned crops.

Stramonium is successfully grown from seed sown direct to the field in spring, while belladonna has thus far been produced from transplanted seedlings. When an attempt is made to transplant henbane seedlings grown in a green-house or frame, the results are discouraging, since the plants seldom recover from the shock of transplanting, and when an occasional plant does survive, it remains stunted and puts on but little growth during the summer. It has been found that injury to the long tap root of the seedling is the cause of this loss which often exceeds 50 percent of the plants set out, hence this method of propagation is not practical on a large scale.

Since transplanting is not feasible, some experiments have been made at the Wisconsin Pharmaceutical Garden<sup>1</sup> to determine the practicability of sowing seed direct to the field. Biennial henbane seed sown in early December 1916, at Madison, Wis., began to come up about May 10, 1917, while some of the same seed sown April 21, 1917, came up May 16, 1917. It is to be noted that the spring sown seed came up only a week later than that sown in fall, and also that it presented a more uniform stand.

In selecting a field for henbane, it is advisable to get a level area comparatively free from weeds, because the slow germination of the seeds, and the low growing habit of the plants, at least until they attain a growth of several inches, makes hand weeding necessary, and this labor as well as that of cultivation is greatly increased in a weedy field. So far as soil is concerned a well drained fertile and friable sandy loam or silt loam gives the best results.

One pound of good henbane seed is sufficient for planting an acre in rows two feet apart. Henbane seed retains its viability several years provided it has been kept dry. Commercial seed which shows a fair percentage germination can be used; however, better results will be obtained from seed which has been collected for planting purposes. If possible, the germination of all drug-plant seeds should be tested before planting, since many ventures have met with failure mainly because poor seed was used. If sown by hand, the seed can be mixed with sand, and dropped into a shallow drill; however, more uniform planting will result if a small seeder is used. The seed should be checked so that one viable seed occurs in every four inches of the row, and due care must be taken to cover the seeds not deeper than about one-fourth of an inch. If necessary, cultivation between the rows to keep down the weeds can be carried on before the henbane plants appear, provided the rows are discernable or have been marked at the ends. Later the plants should be weeded and thinned to stand about four inches apart.

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<sup>1</sup> The Pharmaceutical Experiment Station, Department of Pharmacy, University of Wisconsin and Office of the Drug-Plant and Poisonous-Plant Investigations, Bureau of Plant Industry, U. S. Department of Agriculture, coöperating.

Insects, particularly the Colorado beetle or potato bug, have been perhaps the greatest factor in discouraging the growing of henbane. The potato bug apparently prefers henbane to any other plant in the same family. Spraying with Paris green and with lead arsenate have shown that the latter poison is most efficient. A dilute spray (1:1000) should be applied to the rows when the plants are about one to two inches tall. During the latter part of July when the ravages of the beetle are most severe, another light spray of lead arsenate is usually necessary. Two applications of the insecticide have been found sufficient to curtail the damage from this source. It is advisable to spray the plants several weeks before harvest, and it is necessary that at least one rain should wash the leaves before they are collected.

In order to ascertain whether any appreciable amount of lead arsenate was present on the leaves of sprayed plants, arsenic was tested for according to the method given in the U. S. P. IX. About 200 grammes of green leaves which had been sprayed ten days earlier, and had received one drenching rain, were collected. The surface of each leaf was thoroughly scrubbed with water. After concentrating the 200 Cc. of water used for washing, several tests were made and in each case the trace of arsenic found would amount to less than 0.002 Gm. in each kilo of dried henbane leaves. The arsenic contamination is, therefore, so small as to be negligible.

The crop of leaves should be cut in fall before frost, taken to the drying house and spread thinly either on the floor or in trays, depending upon the available drying facilities. A small amount of heat and a current of air hastens the drying process, and also preserves the green color of the leaves.

Comparative yields indicate that almost twice as much drug can be obtained from the first year's growth than from a similar area of second year plants.

Chemical assays of the leaves of the second year's growth biennial henbane showed a total of 0.07 percent of alkaloids, while leaves of the first year's growth grown from the same seed gave 0.067 percent of the alkaloids of hyoscyamus. It is evident from these assays that the activity of the drug is about the same whether collected the first or second year.

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#### SYMPOSIUM ON DRUG CULTURE.

W. W. STOCKBERGER.

I availed myself of my opportunity as secretary to use that old principle that it is easier to get somebody else to do your work than to do it yourself, so instead of preparing and presenting a paper I suggested this symposium, and I trust that I shall not fail to be rewarded by having a number of those present deliver my paper for me.

The main thesis which I wish to bring to the attention of the Section has already been enunciated by our old friend Dr. J. U. Lloyd.<sup>1</sup> In his comments following the exhibition of the reel of pictures on drug cultivation you will remember that he, out of his years of wisdom and experience, recognized the importance of fully appreciating the resistance to be overcome in every enterprise. I am fully convinced that the commercial cultivation of drug plants at least is not a romantic adventure, but that it is a practical business proposition. It so happens, by virtue of the position which I occupy, that I learn much of what is going on in this country with respect to drug cultivation. What I wish to emphasize is this: That even among the men who are the leaders, or who ought to be the leaders in this subject, there is the most extreme

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<sup>1</sup> These remarks have been omitted because they are in substance repeated by this speaker.