

## DRUG-PLANT CULTURE IN 1916.\*

BY W. W. STOCKBERGER.<sup>1</sup>

During the past two or three years, the production of literature on the cultivation of medicinal plants has proceeded with what may well be called a breathless rush, and while we are as yet far from being certain that our feet are on firm ground, nevertheless it is highly desirable at this time that we pause for a while to consider well the direction in which we are so rapidly moving. It is possible, even probable, that unexpected or unconsidered difficulties will be encountered at no great distance ahead. The enthusiasm and optimism responsible for the tremendous wave of interest in drug-plant culture which has indeed gone around the world has for the most part stifled the voices of those who would inquire more thoroughly into the economic aspects of drug-growing before attempting to engage therein on a commercial scale. The shortage in botanic drugs with the corresponding sharp advance in prices which we have all noted during the past two years has apparently been accepted widely as an indication that the requirements for these materials are practically unlimited, that the supply can never overtake the demand, and that the present inflated prices will not decline from their present levels at least for a long time to come. Although the total output of medicinal plants represents but a very small fraction of the world's commerce in agricultural products, I will hazard the statement with little fear of contradiction that there has been more excitement and enthusiasm manifested about the cultivation of medicinal plants than there has with regard to many other economic products, the value of which exceeded by many times that of our botanic drugs and for which the world's necessity is at least equally great. In the United States, the profits to be realized from the cultivation of medicinal plants has been a favorite theme, both from the platform and in the pharmaceutical press. Abroad, patriotic motives have led individuals to go even further, and as a result the cultivation of medicinal herbs has been undertaken in a number of countries both by individuals and by associations formed for that specific purpose. Among these may be mentioned the Society of the United Irishwomen, The Herb-growing Associations, in England, and The Medicinal Plants Board in Australia.

It is gratifying to note that evidence of returning sanity as regards the drug-plant situation is now accumulating on every hand. From a recent writer<sup>2</sup> in *The Pharmaceutical Journal and Pharmacist*, I quote:

"The enthusiasm of the herb-growing sisterhood is really getting almost a nuisance. A friend of mine who occasionally writes for the press tells me that in a thoughtless moment he gave his printed blessing to this movement, since when rarely a day passes but he has occasion to repent him of his vanity. From all parts of the British Isles he is the regular recipient of letters from patriots who took him too seriously. Medicinal herb-growing is no amateur's pastime, and much disappointment is bound to meet those who think it is. I am told that merchants have been offered a few pounds of newly collected dandelion roots at 105s. a cwt. I should be sorry to say anything to discourage the praiseworthy intentions of that vast if scattered community of ladies and gentlemen who think

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<sup>2</sup> *The Pharmaceutical Journal and Pharmacist*, vol. 96, p. 645, June 24, 1916.

they can help their country by turning their strawberry beds into foxglove plantations, but really someone ought to tell them they are on the wrong track. Occasionally one gets a gleam of common sense through the great black cloud of ignorance."

Another writer,<sup>3</sup> in the *Chemist and Druggist*, expresses much the same idea as follows:

#### The Cultivation of Medicinal Plants.

"This appears to be catching on as the very latest hobby for ladies who have not been able to find any outlet for their energies in the usual (war) channels. I use the term "hobby" advisedly, for I am quite sure that of every hundred people who take up plant cultivation and gathering at least ninety-nine will drop it long before it comes to be a paying proposition. It appears that not only in this

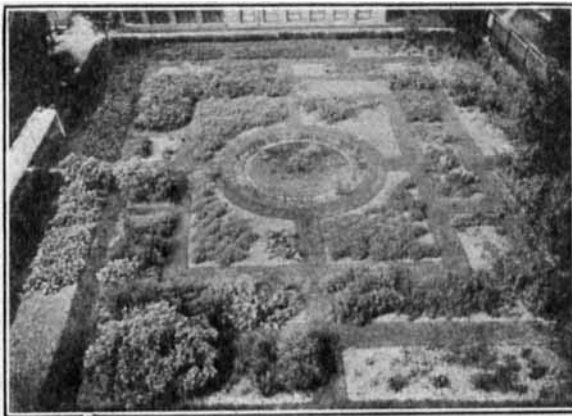


FIG. 1.—General view of the medicinal plant garden, College of Pharmacy, University of Nebraska.

country, but in some allied countries, societies are being started for the promotion of this subject, and where there is behind the promoters sufficient capital to ensure a few years of labour without any remuneration there is the possibility that some profit will by and by be made in the undertaking. At the best, however, it must be a case of casting their bread upon the waters with little hope that it will come back after many days, much less come back 'battered too, for certain,' as Biglow's Pious Editor phrased it. The isolated, spasmodic efforts now being made throughout the country by people, themselves unacquainted with plant-farming, and depending for their information on experts, are hardly likely to add much to the sum total of drugs cultivated in Great Britain."

Prof. J. H. Maiden,<sup>4</sup> the veteran Government Botanist of Australia, in a recent discussion of the cultivation of drug-plants, insisted on great caution in this enterprise and emphasized the fact that "the drug industry is highly technical and the willing man with land must not be encouraged to engage in it until he has acquired the necessary culture knowledge and has suitable land well situated as regards climatic conditions and transport." Prof. Maiden rightly points out the danger of over-production in certain lines and urges the great desirability of a thorough organization of the industry in order that time, money and labor may not be use-

<sup>3</sup> *The Chemist and Druggist*, vol. 88, p. 41, July 8, 1916.

<sup>4</sup> *Botanical Gazette of New South Wales*, vol. 28, p. 134, 1906.

lessly expended in attempting to produce materials in competition with other lands which have a positive advantage owing to their favorable conditions of production or cheaper technical labor involved than in many of the processes of producing botanic drugs.

In this country, there is a growing recognition of the fact that prospective drug growers have derived many false ideas from the numerous well-meaning but over-sanguine newspaper and magazine articles recommending drug culture as a sure and easy means to large and certain profits. However, among those who have given the matter the most careful consideration the opinion is quite general that a successful and permanent drug-growing industry in the United States cannot be built up along the lines which have been so widely recommended. There is, of course, ample opportunity for those who would grow drugs not for profit, but for patriotic, philanthropic or sentimental reasons, but as a purely commercial proposition drug-growing presents fully as many difficulties as any other specialized crop in the realm either of agriculture or horticulture. It is well to reiterate the statement which I have frequently made in other connections that the growing of drug-plants offers little promise as a side crop for general farmers and that conditions in this country are far more favorable to this enterprise if entered into only by well equipped growers who do not need to depend for their livelihood upon this industry, and who have sufficient capital at their command to enable them properly to equip and maintain the enterprise until it can be put upon a paying basis.

At the meeting of this Association held at Detroit, in 1914, I presented before the Scientific Section a paper on medicinal plants in which a differentiation was made between medicinal plant gardens which are industrial and those which are pedagogic in their functions and uses. The industrial garden was defined as one, "the object of which is to give additional information concerning our agricultural resources." It is gratifying to know that since the writing of that paper there has been a substantial and I trust a permanent increase in the public interest in gardens of this character. In addition to the several industrial drug gardens now maintained by the Bureau of Plant Industry in different portions of the United States, there have been developed by several well-known pharmaceutical manufacturers highly creditable industrial gardens which are not only yielding information with respect to the economics of drug-plant production, but which are also supplying in part the manufacturer's requirements for certain crude botanic drugs.

Occasions are conceivable which might excuse an indulgence in glittering generalities with regard to these gardens and there is no gainsaying the fact that as a rule an optimistic or rosy discussion of drug-growing meets with a more ready and appreciative acceptance than is accorded to a conservative statement which directs attention to the risks and drawbacks which will be encountered and consider only material which is well within the realm of fact. Artistic pictures and word-paintings are all very well as a means of stimulating interest in the subject but the mere desire to be interesting should induce no one to place himself in the questionable position of prevailing upon a fellowman to invest his time and money in an enterprise with the expectation of deriving profit therefrom unless he can produce concrete data to show conclusively that such profits may be expected with reasonable certainty. To repeat a pertinent illustration used on a former occasion, let me recall the statements of a writer in one of our well-known pharmaceutical journals who recommended the castor bean as a profitable crop "on rocky and otherwise unprofitable land, on hillsides or

arid desert soil" in the Southwestern States. With charming naivete this same writer later made the admission that he had no personal knowledge whatever of agricultural conditions in the Southwest. A contributor to a recent number of our own A. Ph. A. Journal has also made some surprising recommendations with regard to this same castor oil plant. Both of these writers apparently entirely overlooked the fact that the existence of a demand for a commodity is not necessarily an indication that it is a commercial possibility in this country. The market requirement may be large, and the price apparently attractive, but other factors, among which may be mentioned the price of land, cost of labor, competing crops, and transportation, enter so largely into the commercial aspect of the question that they practically determine whether or not the crop is a commercial possibility.

It would seem therefore that there exists at present a great need for the mul-



FIG. 2.—General view of the medicinal plant garden, College of Pharmacy, University of Minnesota.

tiplication of the industrial type of medicinal plant garden in order that there may be obtained in various sections of the country dependable data on the commercial phase of drug-growing. It should be obvious to everyone that such data to have any practical value must be acquired under practical commercial conditions.

During the past two years, there has been a marked increase of interest in the pedagogic garden, the characteristics and functions of which I have elsewhere discussed.<sup>5</sup> The number of educational institutions which maintain medicinal plant gardens in connection with their courses in pharmacy is rapidly increasing. Among these may be mentioned the Universities of Michigan, Minnesota, Nebraska, Wisconsin and Washington. Similar gardens are also maintained at Purdue, Grinnell, and the State Colleges of South Dakota and Washington. The establishment and proper support of a medicinal plant garden of the pedagogic type as an adjunct to a college of pharmacy or the course in pharmacognosy of a university should be of direct and practical benefit to the students, to the university itself, and finally to the people as a whole. The students should profit from such an enterprise largely from the fact that they can be brought into direct contact with medicinal plants which are in a living state, and learn at first

<sup>5</sup> JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, 3: 1436-1440, 1914.

hand the processes through which material obtained from the fresh plant must pass before it becomes the finished product. They will thus gain a broader and more comprehensive basis on which to develop in them an appreciation of the necessity for a high standard of purity in crude drugs and they will also acquire information with respect to opportunities for sophistication or impairment of quality through faulty methods of preparation and handling and hence become better prepared to exercise the care and judgment necessary in the selection and use of crude drug products. Their interest in and appreciation of *Materia Medica* likewise will receive a great stimulus through their contact in an objective way with crude drugs during their course of preparation. Very important to the students also will be the thorough grounding in the economics of the crude drug trade which they will receive through the proper course of instruction which



FIG. 3.—Interior view of the medicinal plant laboratory, College of Pharmacy, University of Minnesota.

can be given in connection with a pedagogic garden. The student who will make a careful record of the expenditure of labor (preferably his own) necessary to produce a given quantity of drug and then after marketing the same deducts from the returns a fair allowance for his work, will not be likely to become infected with the erroneous ideas now only too prevalent concerning the enormous profits to be derived from the production of medicinal plants.

To the University the medicinal plant garden is an invaluable aid and resource in teaching *materia medica*, pharmacy, pharmacognosy, botany and forestry. The pedagogic garden will furnish much of the living material necessary for the first year's work in botany, and in the pharmacy school the double purpose will be served by using medicinal plants as working materials in the teaching of morphology and general plant histology. The pedagogic garden also affords the student the means for pursuing the study of the production of the actual drugs in the field and the methods of their collection and preparation. The supply of

living plants which can be obtained from the garden will greatly extend the opportunity for research work on the part of advanced students of pharmacy. Most of the specifications regarding time and method of collecting, curing and preserving crude drugs are based on tradition, and not on scientific experiment, and the determination of the relative value of our present requirements with respect to the preparation of botanic drugs affords an almost limitless field for research. In another direction also the study of the variation of the active principle among different species of a genus, or even among individuals of the same species, affords

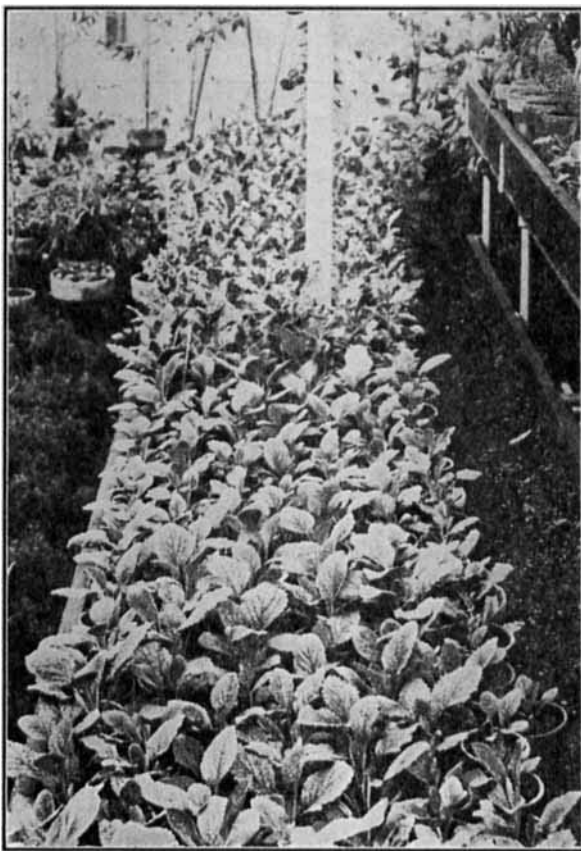


FIG. 4.—*Digitalis* and *hyoscyamus* seedlings in medicinal plant laboratory, College of Pharmacy, University of Minnesota.

great possibilities. The work on belladonna now being conducted by the Bureau of Plant Industry is an illustration of this type of research, opportunities for which are practically without number and many of which may easily be made evident to the student through the proper use of the medicinal plant garden. By this means not only will the effectiveness of the teaching be increased, but the interest and appreciation of the students in this line of work will be aroused and held, results both of which are quite in harmony with the higher interests of the University.

To the people as a whole, the establishment and maintenance of the pedagogic drug garden in connection with our institutions of learning are of direct value in many ways, only a few of which there is now time to mention. It will furnish

information regarding the medicinal plants which are adapted for cultivation in the particular locality in which the garden is located, and thus in time provide a fund of information of permanent value to the agricultural population of the region. Such information will be of especial value in the immediate future, since the necessity for a wider diversification of the agriculture of many localities is receiving increased recognition and further since for large areas there exists practically no reliable data regarding the agricultural possibilities for medicinal plant culture. The pedagogic garden properly directed will perhaps lead to the development of the larger, and in some respects more important industrial gardens which in turn may point the way to new agricultural industries. Although these industries may be relatively small as compared with staple crops, yet they will con-



A COMMERCIAL TEST AND BREEDING PLOT OF BELLADONNA.

tribute to a more diversified agriculture and afford opportunities for an individual here and there to add to his income or better to utilize the agricultural facilities which they already possess. By more widely diffusing knowledge respecting medicinal plants, the pedagogic garden should lead to a fuller utilization of the natural resources of the country, and should be the means not only of training students who are to be pharmacists along these lines, but also of arousing a wider interest in these resources, and in the dissemination of knowledge regarding them and their inherent possibilities. If the garden is conducted on a sufficiently large scale, it will furnish data on the production of drug-plants which when properly prepared and disseminated will safeguard the people of the country from loss through ill-considered ventures in drug-plant cultivation. The country is now full of talk about the enormous profits to be made from the growing of medicinal plants, all of which means nothing if it cannot be supported by positive concrete evidence of profits realized or material advantage to be gained. It is to be hoped

that the work of the pedagogic and industrial drug gardens will continue to develop hand in hand and that by means of the trustworthy data acquired from each, the commercial production of botanic drugs in the United States may be placed upon a sound basis, the quality of drugs of this class be increased, and a general good result to our people as a whole.

## DISCUSSION

R. A. LYMAN: Just a word about the Drug-Plant Garden work. I think this subject is very important at the present time. I know of a number of instances where there was considerable difficulty in making the officials of the institutions which they represent become interested in the drug-plant garden for teaching purposes. Many think it is useless. I had that condition to meet in Nebraska, but in the course of two or three years the drug-plant garden has become one of the most interesting points in the city of Lincoln, and I find it is being advertised, not only on the campus, but by the leading commercial club and I find reference to it in the leading newspapers of the State. It has given the people a very different idea of pharmacy; because of the fact that the war has so influenced the importation of crude drugs, the attention of the people has been called to the necessity of getting an adequate supply of crude drugs, and the war has helped this matter very greatly.

I look at it from an entirely educational standpoint just at the present time. The Regents of our institutions understand that it takes money to establish a laboratory, and I look upon the drug-plant garden as a laboratory. They would not think anything of paying seventy-five to a hundred thousand dollars for a laboratory to do a certain thing, and it should be put up to them that a drug-plant garden represents a laboratory and has become a source of information where we can get things for the university and for the college of pharmacy which we cannot obtain in any other way.

Again, the drug-plant garden idea has been an inspiration to students and students have begun to think differently about the study of drugs. Many students go out from the university and start gardens in their home towns. I do not say that they will produce a great number of plants and largely increase the supply of drugs, but they are interested in the professional things of pharmacy. It interests them in research work, in that they are trying to produce things that were not produced before.

I want to personally thank Dr. Stockberger for his paper, and for the assistance he has given me in helping me to develop the garden at the University of Nebraska, not only by furnishing available material, but with the suggestions he has given me from time to time.

C. E. VANDERKLEED: By way of encouragement to schools of pharmacy, it was my privilege last year to pay a visit to the University of Berlin, and while they have beautiful laboratories, well equipped, what to me was the most impressive thing was the botanical garden covering acres, in which they were raising every plant—every medicinal plant—it was possible to raise in that climate. Dr. Thoms became quite enthusiastic in telling of its value to the student by being able to go out into that garden and collect a plant containing a sufficient amount of, say, volatile oil, take it into the laboratory and properly cure it and distil the volatile oil and obtain the finished pharmaceutical product, and there is no reason why our pharmaceutical schools should not have this same advantage for their students.

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