over long periods, the disease being present in destructive form almost every year until the final and best strains are quite resistant. The writer has found it very much less difficult to procure plants from fiber strains which, apparently, are wholly free from the effects of rust. Almost any sample of fiber seed will produce a certain percentage of plants resistant to the wilt disease while in the case of seed strains it is often necessary to work a number of years in order to procure a reasonable showing of resistance.

BREEDING FLAX FOR FIBER TYPE OF PLANT.

PROF. J. H. SHEPPERD, *Fargo, N. Dak.*

Securing foundation plants of flax to begin breeding work with is not so difficult a task as securing foundation stock of wheat, oats, or barley. The flax plant maintains an individuality in the field which allows the breeder to identify it. This fact permits the breeder to inspect thousands of plants and choose among them. The average

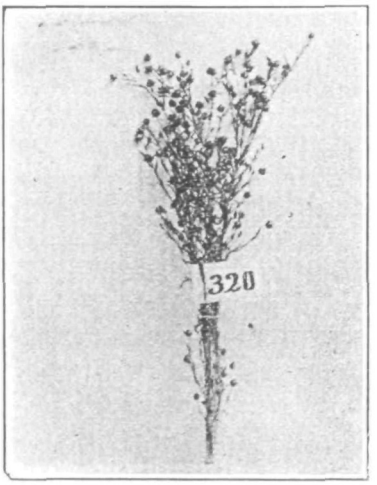

Fig. 1.—Flax Plant—Short Individual.

field of flax presents wide extremes in type. A few plants stand several inches higher than the rest, some show marked shortness of growth, and others still different characters such as extra large bolls and seeds, extra heavy branching, etc. Whether these types come from a mechanically mixed sample, cross breeding, or from wide variation, I will not attempt to say. When the foundation stock is secured, however, and grown under pedigree methods additional differentations occur and when the new character is once taken on it seems to quickly adhere to the strain and to be regularly reproduced.

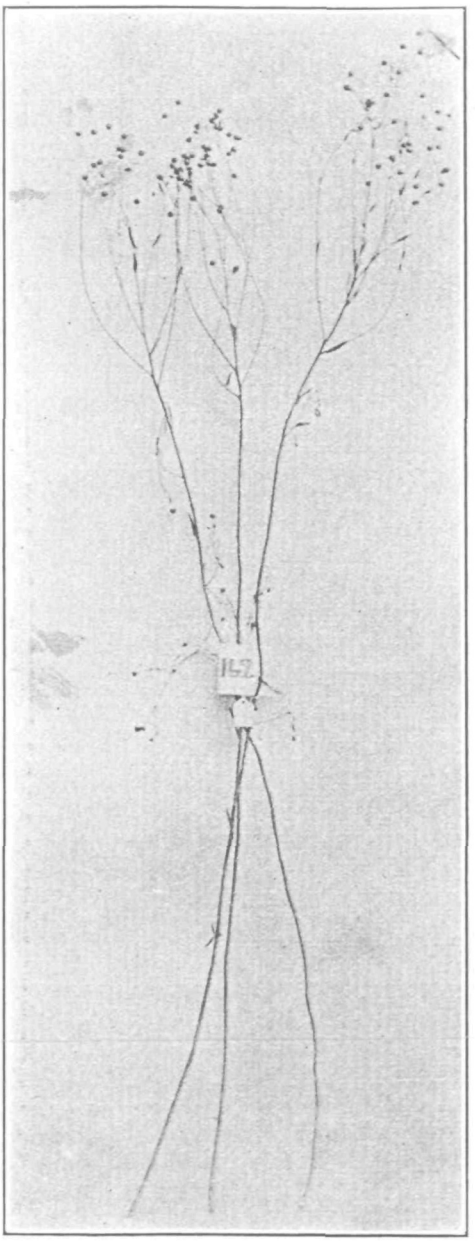

Fig. 2.—Flax Plant—Long Individual.

In the accompanying illustration for example, No. 156 represents three plants from a strain which has the peculiarity of being very fine-stemmed and light in haulm. These stems were so weak from this lightness of haulm that the plants could only maintain an erect position until they reached a height of 6 to 8 inches. The resulting kinks in the stem are plainly visible in the picture. These plants are quite uniform in this recumbent habit of growth, the entire hundred constituting the centgener, literally lay prostrate upon the ground at harvest time. The upturned portion when fully ripened is indicated by the curve in the upper portion of the plants photographed. The plants of this breeding were selected for slender stems and gradually became weaker, smaller-bolled, and smaller-seeded. The No. 156 strain commonly sent out one branch near the surface of the ground, and at maturity had two stems of nearly equal length and size. No. 162 measured 50 inches in height, was strong, stood up well until fully ripe, and, while its bolls were not abundant as compared with those upon flax bred for seed only, they were plentiful and the seed was plump, of good color, and of strong vitality. The No. 162 flax showed little tendency to throw out branches as will be seen by inspecting the illustration. A few of the plants produced a branch near the surface of the ground that made a collateral stem of good size, while additional ones threw out a spindling branch near the ground which produced a weak growth having no value. About 50 per cent of the flax of this breeding is like the three plants shown in the illustration, i. e., producing a single stem which does not branch until it reaches nearly full height like those shown in the illustration where the stem does not branch until it reaches a height of 3 feet.

The flax represented by pedigree No. 163 illustrate a tall slender-growing type of plants which reached a height of 48 inches, but which threw one, two, or three useless branches near the base, besides heading low with long redividing culms which made very inferior fiber plants as compared with No. 162. The flax of this breeding became quickly fixed in this habit of growth and the plants shown fairly represent the entire hundred as they grew in the centgener plat.

Stocks 320 and 162 shown herewith, measuring 18 and 50 inches respectively, indicate that this species of plant is capable of wide differentiation. Each group in the photograph consists of three plants from centgener-grown hundreds which guaranteed each the same soil space and otherwise equal chance for development.

The work of the writer has been more extended in the line of breeding flax for seed production, and in that work I have found the same tendency to take on regular and irregular branching and height characetrs and to quickly become established in these types so that they will be reproduced regularly.

The use of binding twine made from flax fiber seemed very promising for a time, and a trial with it by the writer on the North Dakota Station farm showed that it had the requisite strength and handling

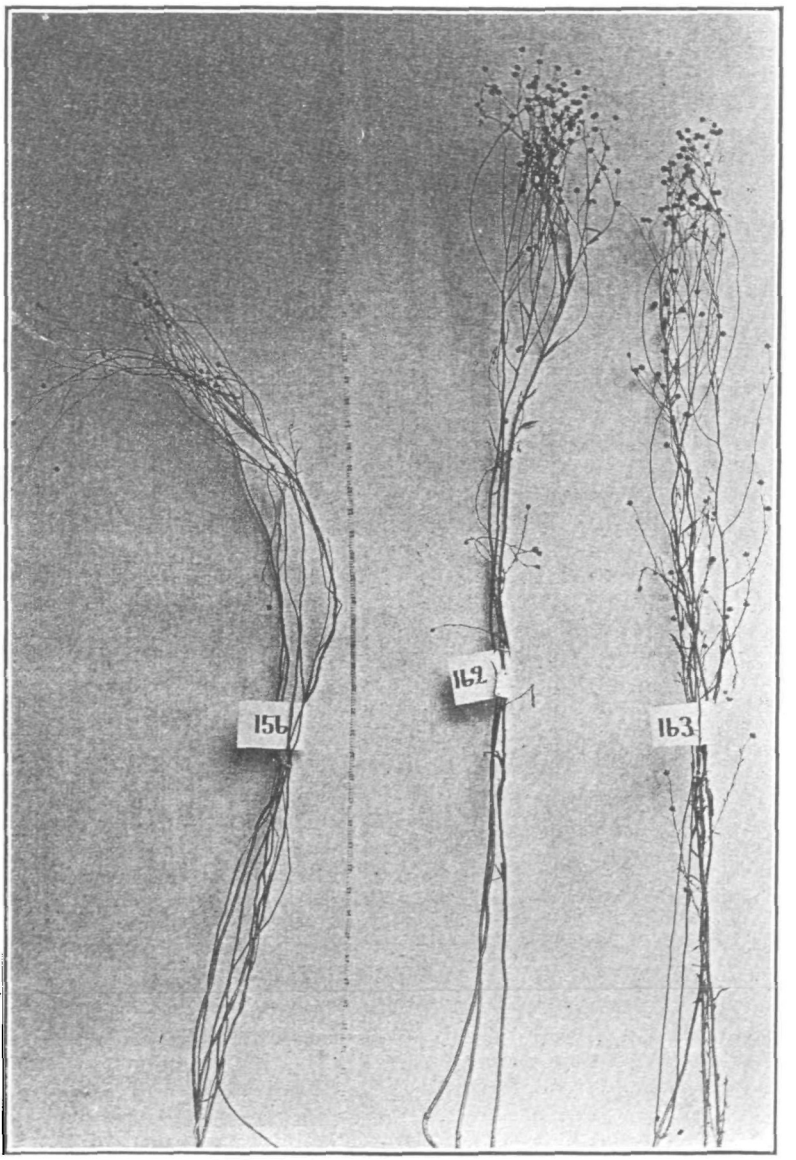

Fig. 3—Variation in Flax.

power to serve that purpose. The International Harvester Company has found, however, that in Iowa and regions further south, grasshoppers cut the bands of the flax fiber twine in the field so badly as to really prohibit its use. That Company was trying numerous chemical treatments at harvest time in 1907 upon the fiber in a search for something distasteful to that class of insects.

It is not certain that a demand for flax fiber of the coarse short grade will be immediately forthcoming; and it is likely that labor prices and business conditions must change before a demand for fine fiber flax will occur in this country. It seems, certain, however, that a suitable type of flax for producing fine and long fiber can be produced by breeding and turned over to the grower as soon as the manufacturer can offer him a remunerative price for it.

REPORT OF THE COMMITTEE ON BREEDING VEGETABLES.

W. W. TRACY, SR., *Washington, D. C., Chairman,*
PROF. N. E. HANSEN, *Brookings, S. D.,*
PROF. W. M. MUNSON, *Morgantown, W. Va.,*
MR. S. W. OLIVER, *Washington, D. C.,*
LEONARD H. VAUGHN, *Chicago, Ill.,*
C. N. KEENEY, *Le Roy, N. Y.,*
DR. BYRON D. HALSTEAD, *New Brunswick, N. J.,*
H. B. FULLERTON, *Wading River, Long Island.*

OBJECTS: To investigate and report on methods of improving vegetables by breeding; and to encourage the production of improved purebred varieties of vegetables suited to each condition of climate, soil, use, and market.

(Report submitted by the Chairman.)

EXISTING CONDITIONS.

We have but very little actual knowledge as to the practical usefulness of different characteristics, and still less as to the correlation of those discernible to the eye with those not so discernible, but of even greater practical value as adapting the plant to different cultural and market conditions and uses. Our record of modifications which have been developed from time to time is very imperfect and incomplete, and in consequence breeders are constantly presenting as new varieties, forms which in previous trials had proved to be of so little practical value that they had dropped out of common knowledge and cultivation.

The number of varietal names in more or less common use is very much greater than that of the really distinct and useful varieties. One reason for this is the use of distinct varietal names to denote simply the relative purity and quality of different stocks which are really the same variety. Another is the want of knowledge as to the name by which any given variation is or has been known. From this and other causes there is a want of uniformity in the names by which each distinct variation is known as well as in the variation which any given name shall stand for.