

I. INTRODUCTION.

The present sunflower selection project was begun at the Imperial College of Tropical Agriculture in the autumn of 1936. The stated object was the production of "a type of sunflower which will make a useful green manuring crop in the tropics" (Forbes 1937).

It would seem that the type of plant best suited for the expressed purpose should have three main qualifications. (1) It should produce a large quantity of green matter in as short a time as possible. (2) It should be able to thrive when grown in close canopy. This is very important since upon it depends the yield of green matter per acre, and the ability to smother weeds. (3) It must be able to produce good seed freely so that an adequate supply may be obtained from a reasonably small area.

II. PREVIOUS WORK ON THE PROJECT.

From the sunflowers grown on the College Farm forty single plant selections were made in the spring of 1936. The population from which these were chosen came from the admixture of four strains which had been imported, two from Barberton (B3 and B4), and two from the Salisbury Experimental Station (Nos. 30 and 44). From the forty individual plant selections twelve were picked for planting in the autumn of 1936, using seed type as the basis of selection.

Two methods of breeding were begun, mass selection, and selection within selfed lines. The material for mass selection was grown in isolated plots and individuals conforming most nearly to the desired type were selected to produce

seed for the next generation. The method emphasized by Forbes however, was selection within selfed lines and the possible crossing of these to restore hybrid vigor after they had become true breeding.

It is in part the purpose of this paper to consider the suitability of these two breeding methods, and to suggest any others which might be of value. It has been considered desirable to make a reasonably complete review of the literature on sunflower breeding and genetics, and to include information on related species which might be used in hybridization work.

III. REVIEW OF SUNFLOWER LITERATURE.

Breeding.

Other work on sunflower breeding differs from the present project in that it is concerned with oil producing varieties, and the combining of earliness, and resistance to disease and insect pests, with a commercial yield.

It has been considered desirable to review the work which has been done. However, since the sunflower breeder in the tropics is not likely to be concerned with *Orobanche*, *Homeosoma*, and *Puccinia*, the section dealing with these has been placed in the appendix.

Some attention has also been devoted to early maturity. A variety produced by Planckek (1930a) matures in 72-74 days, and Safonov's (1934) dwarf sunflower "Karlik" ripens in 72-76 days. Common forms take 104-125 days to ripen. A Russian review (1936) reports the production of a variety taking only 70 days, and a Canadian review (1936) states that earlier maturing and more productive strains have been obtained in that country.

Among the other problems which are being investigated in Russia are drought resistance, self fertility, and perennial habit.