ONE YEAR'S EXPERIMENTAL WHEAT SCHEDULE AT PULLMAN, WASHINGTON, U.S.A.¹⁾

By

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For genetic studies and plant breeding advancement, a number of consecutive generations must often be grown from a single parentage. The usual limitation of one growing season per year greatly retards the efforts of the geneticist and breeder, and it has been found that this limitation can be overcome, in the case of some annual crops, by using a greenhouse. In some areas of the United States and Canada, where winters are long and sunny and planting is done late in the spring, as many as three consecutive generations a year of spring-sown cereals can be grown, raising two generations in greenhouses during the winter and one generation in the field in the summer.

There is too little sunshine during the winter at Pullman, Wash., to grow to maturity more than one generation during that season, but even this amount greatly accelerates a genetic or breeding program in, for example, wheat. For general information, there follows a brief description of year's growing schedule in wheat research at the Department of Agronomy, State College of Washington, Pullman, Washington, U.S.A.

I. Winter Wheat

1st generation

1. Plants in the field are harvested around August 15 to September 1.

2. Seeds are planted immediately in the petri-dishes.

3. Germinated seeds, when the shoots are almost breaking the bran layer, about 24 hours after planting, are vernalized at 1–3°C for 4 to 6 weeks according to the degree of winteriness of the varieties.

4. Vernalized seeds are potted in the greenhouse around September 15 to October 1. For crosses, 4 pollen parents are planted in each 6-inch pot, while one mother plant is planted in a 5-inch pot, which provides sufficient space for better tillering.

Four or 5 pollen parents should be planted for each mother plant, so that sufficient pollen can be obtained. Furthermore, to insure an adequate pollen supply when the mother plants flower, the prospective pollen parents should be removed from the cold room and potted at 'staggered' intervals, about 10 days apart, surrounding the time of potting of the mother plants. Four or 5 of these intervals should suffice.

5. Automatic lighting system with 6 fixtures, each containing four 40 W fluorescent tubes¹⁾, is set at a height of 4 ft. from the seedling bed in the 12 × 25 ft. greenhouse and is regulated to give 16-hour days through the growing season.

6. Better tillering is obtained in lower temperatures around 60°F., but the temperature frequently rises to 80–85°F. in sunny weather. If sunlight is intense when plants are first placed in the greenhouse, a coat of whitewash is applied to the outside of the glass, which will be washed away later in the winter to let the sunlight penetrate.

7. Plants should be watered daily and a moderate fertilizer solution should be applied about every 2 weeks.

8. Plants flower around February 1 to 20 and the crosses are made during this period.

9. Seeds are harvested around March 1 to 20.

2nd generation

10. Seeds, thus obtained in the greenhouse, are planted in the petridishes around March 15 to 31.

11. About 24 hours after the planting, the seedlings are vernalized at 1–3°C for 4 to 6 weeks.

12. Vernalized seedlings are planted in the field around April 15 to 30.

13. Plants flower around July 15 to 31, and crosses are made during this period.

14. Seeds are harvested around August 15 to 30.

II. Spring wheat

1st generation

1. Plants in the field are harvested around August 15 to September 1.

2. Seeds are planted in the greenhouse pots around October 15 to 31.

3. Flowering takes place around February 15 to March 1, and crossing is done during this period.

1) Mazda daylight, Westinghouse soft white, etc.

1) The manuscript was prepared in March 1952.

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(Fig. 1).

4. Seeds are harvested around March 15 to April 1.

2nd generation

5. Seeds obtained in the greenhouse are planted in the field around April 1 to 15.

6. Flowering and crossing time is around July 1 to 15.

7. Seeds are harvested around August 1 to 15.

Fig. 1. Wheats in a greenhouse, March 1952, at the State College of Washington, Pullman Washington, U. S. A.

Postscripts

We have received a letter from Dr. L. Smith¹⁾ stating in part, "In order to obtain good plants, it is absolutely essential to have low temperatures (50-60°F.) in early stages of growth. After about 3 months, when the plants are well tillered, the temperature should be raised to between 60-70°F., together with lengthening days. During this period, day-length should be 12-15 hours per day, although some recent studies have shown that a short period of illumination of about 30 minutes around midnight is just as effective in inducing flowering."

Furthermore, Mr. M. Okamoto, who is now stationed at the University of Missouri, has sent us a brief note about the schedule in Missouri as follows:

Temperature: 60-65°F. in the night and 70-80°F. in the daytime.

	1st generation	2nd generation
Planting:	September 10-30	March 1-30
Meiosis:	November-January	April-June
Flowering:	December-January	May-June
Harvest:	February-March	June-July

1) The death of Luther Smith on June 4, 1952, in Pullman, Washington cut short the career of a capable and productive cytogeneticist. His untimely and was due to lung cancer, from which he had been suffering since November, 1951.