INDUCTION OF FERTILITY BY COLCHICINE TREATMENT IN RONPHA GRASS, A STERILE INTERSPECIFIC PHALARIS HYBRID

Ronpha grass, a sterile natural hybrid of *Phalaris arundinacea* and *Phalaris tuberosa* var. *stenoptera,* was introduced to Queensland from South Africa, where it is used mainly as supplementary green grazing under irrigation for cattle and sheep during the winter months in the summer rainfall region. It has shown desirable characteristics under testing in the subtropical environment of Central Queensland.

Ronpha grass produces inflorescences in abundance over an unusually long period. This lengthening of the flowering period has often been observed in male-sterile plants belonging to pure species and interspecific and intergeneric hybrids. Flowering in Ronpha grass is very incomplete. Some florets exsert both anthers and stigmas quite normally, but the anthers are slender and often shrivelled, and they do not dehisce. Some florets do not exsert the stigmas nor the anthers and

Fig. 1.—Typical plants of Ronpha grass.

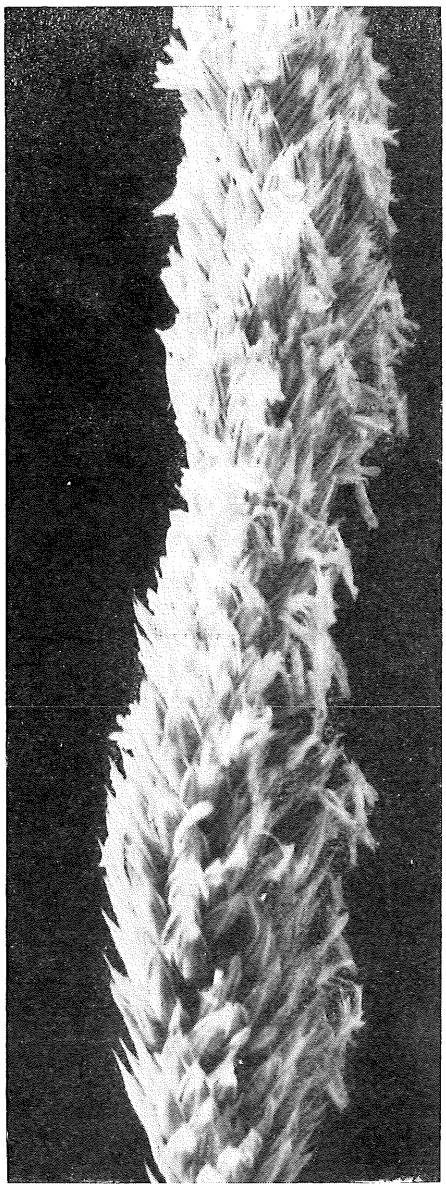

Fig. 2.—Normal anthesis of Ronpha grass after treatment with colchicine.

they shrivel *in situ* without liberating any pollen. This is in agreement with the incomplete flowering of the *P. arundinacea* x *P. tuberosa* hybrid produced by artificial hybridization by Jenkin and Sethi (1932).

Microscopic examination of the pollen grains of Ronpha grass at Biloela Regional Experiment Station has shown a small percentage (2–4), of stainable pollen. This hybrid, however, is functionally male-sterile owing to the non-dehiscence of the anthers. Over 3,000 seedheads were threshed by hand and no viable seed was obtained.

Hutton (1953) obtained the allopolyploids of *P. tuberosa* x *P. minor* and *P. coerulescens* x *P. minor* hybrids by cutting back growth to 2 cm from the ground and painting plants with an aqueous solution containing 0·2 per cent. colchicine and 0·1 per cent. spreader. This treatment was repeated on six successive days.

In the present study, clonal material of Ronpha grass was treated with a 0·2 per cent. aqueous solution of colchicine. The methods of application were as follows:—

(1) Immersion of young tillers in colchicine for 12 hr after cutting the top growth back to about 2 cm from the base.

(2) Immersion of similarly treated tillers in colchicine. Partial vacuum was applied for 3–4 min to remove air bubbles.

(3) Injection of colchicine into decapitated vigorously growing tillers with a hypodermic needle.

An excess amount of solution was used and the treatment was repeated daily for 4–6 days.

Of the plants treated by the above methods, 6 per cent. produced one seedhead per plant which exhibited normal anthesis (Figure 2). The pollen grains collected from these seedheads were regular in shape (Figure 3) and size and 69 per cent. were stainable. They set fertilized seed at the rate of 155 seeds per 100 cm of seedhead. The seeds have shown high germinating capacity on sterilized sand.

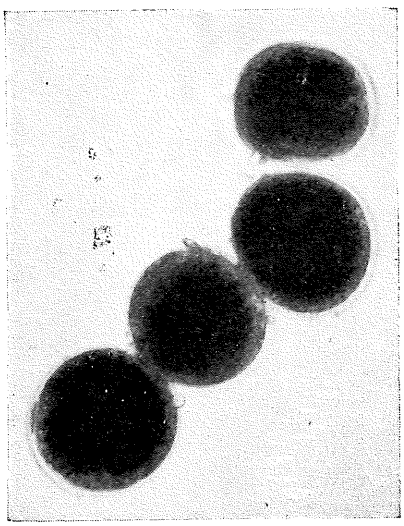

Fig. 3.—Well-formed stained pollen grains of Ronpha grass treated with colchicine.

There is no indication that any of the colchicine treatments used was superior in effect to the others. However, immersion in colchicine is a convenient method for the mass treatment of clonal material, especially when large numbers of plants are required for progeny evaluation.

REFERENCES

HUTTON, E. M. (1953).—Production of allopolyploids in Phalaris by a modified colchicine technique. *J. Aust. Inst. Agric. Sci.* 19: 244-7.

JENKIN, T. J., and SETHI, B. L. (1932)—*Phalaris arundinacea, Phalaris tuberosa,* their F.1. hybrids and hybrid derivatives. *J. Genet.* 26: 32-67.

B. GROF,
Queensland Department of Agriculture and Stock.

(Received for publication July 15, 1960)