

AN ATTEMPT TO HASTEN THE GERMINATION OF MATAI AND MIRO SEED USING CONCENTRATED SULPHURIC ACID

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SUMMARY

Seeds of matai (Podocarpus spicatus R.Br.) and miro (P. ferrugineus D. Don) were soaked for up to 72 hours in concentrated sulphuric acid at room temperature and then stratified for 82 days. Soaking for longer than 72 hours destroyed most of the seed. The treatments did not stimulate any germination of miro but the 72 hour treatment did result in an 11% first season germination of matai as compared with approximately 1% for the untreated seed. Subsequent germination of untreated matai in the second season was 32%. There was little or no germination of treated seed in the second season.

INTRODUCTION

The treatment of seeds having hard and impermeable coats with acids, followed by a period of moist cool storage, is sometimes effective in rendering the testa permeable (and in hastening germination (Baldwin, 1942; Barton and Crocker, 1948; Robertson, 1948). The seed coats of both matai and miro are extremely hard and woody and do not germinate readily when sown—even after six months moist, cool pretreatment or stratification. Mass germination of matai usually occurs one year after sowing; miro takes three or four years to germinate. This note describes an attempt to hasten germination of these species by treating the seed with concentrated sulphuric acid.

MATERIAL AND METHODS

Seed for this experiment was collected from Whirinaki S.F. and Pureora S.F. (both central North Island) in the autumn of 1957. It was cleaned, partly dried, and then placed in cool storage until the beginning of August 1957, when the samples were withdrawn for the trial. Nine×100 seed samples of matai and nine×50 seed samples of miro were counted out, any malformed or damaged seed being discarded in the process.

The samples of dry seed were then placed in concentrated sulphuric acid (H_2SO_4) for 0, 9, 18, 27, 36, 45, 54, 63 and 72 hours respectively. (A preliminary trial showed that the majority of seeds of both species suffered obvious damage to the endosperm and probably damage to the embryo as well when soaked for longer than 72 hours.) Upon completion of treatment each sample was thoroughly washed with cold running water (to minimize heating) and the carbonized portion of the seed coat removed. The seed was then soaked with several changes of water for four days after which it was stored under moist cool conditions for 82 days. At the end of this period (October) it was sown in boxes, covered with coarse sand and placed in the glasshouse. Some seeds found to have

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decayed during stratification as a result of the testa being breached by the acid were discarded just prior to sowing. These amounted to 23% in the lot treated for 72 hours (see Line B of Table 1).

RESULTS AND DISCUSSION

The first matai seedling appeared after 39 days. Thereafter germination proceeded in two phases — Phase I: spring and summer 1957/1958; Phase II; spring and summer 1958/1959. See Fig. 1; Table 1.

No germination of miro occurred; when finally inspected in March, 1960, all the seeds, both treated and untreated, were found to have decayed.

Since only one of the untreated matai seeds germinated in the first phase or season it can be assumed that most of the germination occurring among the treated lots at this time may be attributed to the acid treatment. This assumption is further supported by the fact that the longer the period of treatment the sooner did Phase I germination commence. Thus the acid treatment did have some effect in hastening germination.

In Phase II, germination was mainly among the untreated seed (32% — itself a low figure) with very poor germination (1 to 3%) in lots treated with acid for up to 45 hours, and none in lots treated for longer than this. This suggests that while acid treatment improves germination moderately in the first year it seriously reduces the life of the ungerminated seed, either through direct

TABLE 1: GERMINATION RESULTS FOR MATAI

	Date	Hours in acid									
		0	9	18	27	36	45	54	63	72	
PHASE I Spring & Summer 1957/1958	6 December, 1957	—	—	—	—	—	—	—	—	—	1
	7 December, 1957	—	—	—	—	—	—	—	—	—	1
	9 December, 1957	—	—	—	—	—	—	—	1	—	1
	12 December, 1957	—	—	—	—	—	—	—	—	—	1
	14 December, 1957	—	—	—	—	—	—	—	—	—	1
	19 December, 1957	—	—	—	—	—	—	—	1	—	—
	20 December, 1957	—	—	—	—	—	—	—	—	—	1
	21 December, 1957	—	—	—	—	—	—	—	1	—	1
	22 December, 1957	—	—	—	—	—	—	—	—	—	1
	23 December, 1957	—	—	—	—	—	—	1	1	1	1
	6 January, 1958	—	—	—	—	—	1	1	1	—	1
	10 January, 1958	—	—	—	—	1	—	1	1	—	—
	16 January, 1958	—	—	—	—	—	1	—	—	—	—
	30 January, 1958	—	—	—	—	1	1	—	1	1	1
	13 March, 1958	1	—	—	—	—	—	—	—	—	—
Total 1957/1958	1	0	0	0	2	3	3	6	11		
As % of A.	1.0	0	0	0	2.0	3.0	3.0	6.0	11.0		
As % of C.	1.0	0	0	0	2.2	3.2	3.2	6.6	14.3		
PHASE II Spring & Summer 1958/1959	10 November, 1958	30	1	—	3	1	3	—	—	—	
	30 January, 1959	2	—	1	—	—	—	—	—	—	
	Total 1958/59	32	1	1	3	1	3	0	0	0	
	As % of A.	32.0	1.0	1.0	3.0	1.0	3.0	0	0	0	
	As % of C.	32.0	1.0	1.0	3.0	1.1	3.2	0	0	0	
A No. Seeds Treated	100	100	100	100	100	100	100	100	100	100	
B No. Seeds Damaged	0	3	4	0	8	6	7	9	23		
C No. Seeds Sown	100	97	96	100	92	94	93	91	77		

damage or by rendering them more susceptible to fungal attack. Many of the treated seeds may even have decayed during stratification. Thus any advantage derived from acid treatment (followed by stratification) in the first year is largely offset by (a) the immediate destruction of up to one quarter of the seed (when treated for 72 hours), and (b) much lower overall germination as compared with that of the untreated seed.

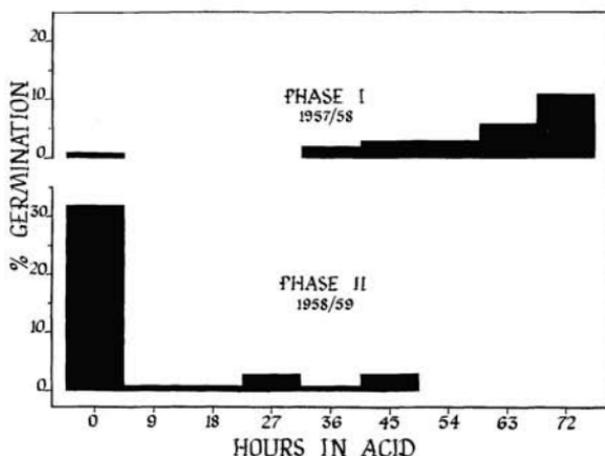


Fig. 1: Germination pattern resulting from the treatment of matai seed with concentrated sulphuric acid.

CONCLUSIONS

- (1) The treatment of clean, dry matai seed for approximately 72 hours with concentrated sulphuric acid at room temperature (c. 21° C) can improve germination in the first year from approximately 1% (for untreated stratified seed) to 11%.
- (2) Acid treatment can hasten germination by 12 months but may yield only one-third the number of seedlings obtainable from untreated seed.
- (3) Very few treated seeds survive into the second year when the mass germination of untreated seed occurs.
- (4) The germination of miro does not appear to be favourably affected by sulphuric acid treatment. (Since the untreated seed failed to germinate and was found to have decayed after three years it may not have been viable even at the time of treatment.)
- (5) It is possible that stratification adversely affects seed treated with acid and that better germination might be obtained if the seed were sown immediately after acid treatment.

REFERENCES

- Baldwin, H. I., 1942. *Forest Tree Seed of the North Temperate Regions*. Chronica Botanica Co., Waltham, Mass. p. 143.
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