The Germination of Spartina Townsendii

BY

ALEXANDER NELSON AND J. M. MUNRO.

With five figures in the text.

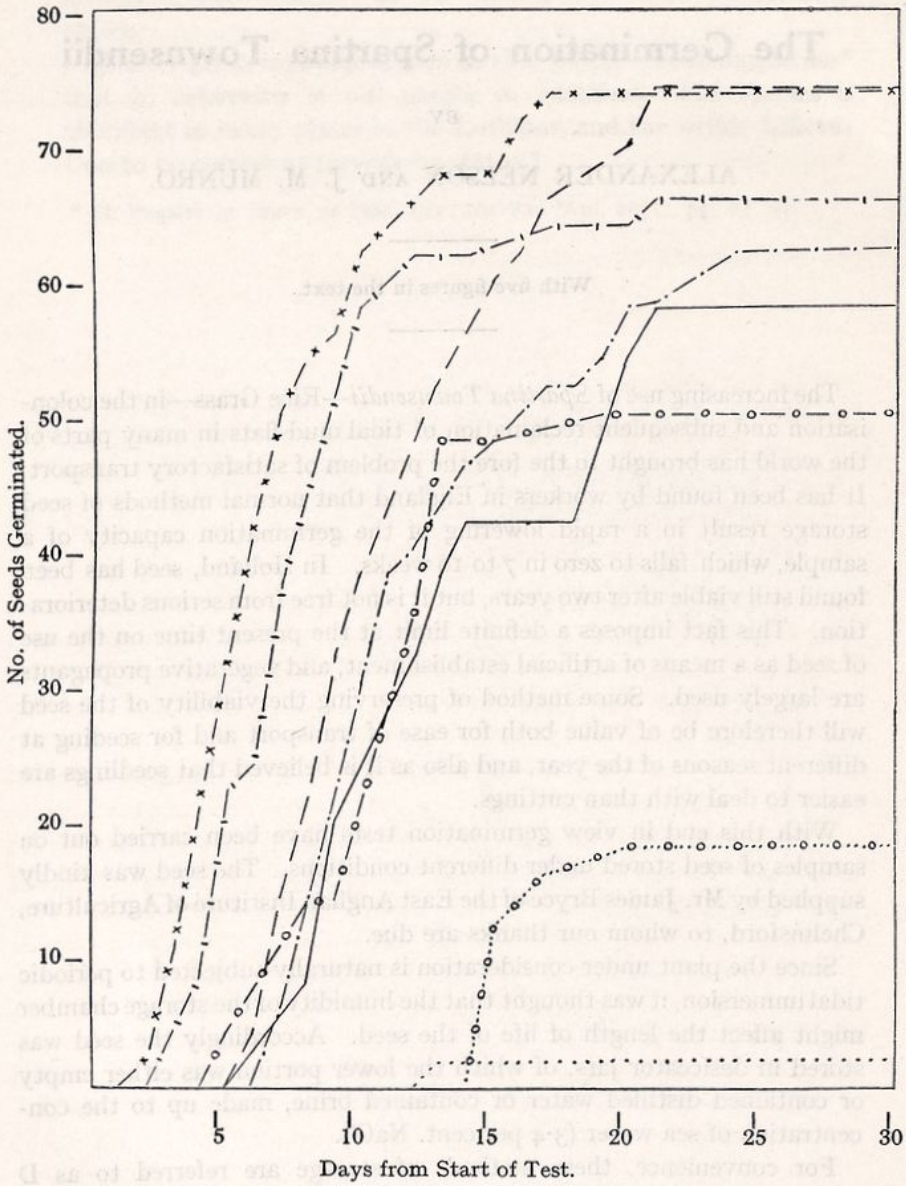
The increasing use of *Spartina Townsendii*—Rice Grass—in the colonisation and subsequent reclamation of tidal mud-flats in many parts of the world has brought to the fore the problem of satisfactory transport. It has been found by workers in England that normal methods of seed storage result in a rapid lowering of the germination capacity of a sample, which falls to zero in 7 to 10 weeks. In Holland, seed has been found still viable after two years, but it is not free from serious deterioration. This fact imposes a definite limit at the present time on the use of seed as a means of artificial establishment, and vegetative propagants are largely used. Some method of preserving the viability of the seed will therefore be of value both for ease of transport and for seeding at different seasons of the year, and also as it is believed that seedlings are easier to deal with than cuttings.

With this end in view germination tests have been carried out on samples of seed stored under different conditions. The seed was kindly supplied by Mr. James Bryce of the East Anglian Institute of Agriculture, Chelmsford, to whom our thanks are due.

Since the plant under consideration is naturally subjected to periodic tidal immersion, it was thought that the humidity of the storage chamber might affect the length of life of the seed. Accordingly the seed was stored in desiccator jars, of which the lower portion was either empty or contained distilled water or contained brine, made up to the concentration of sea water (3·4 per cent. NaCl).

For convenience, these methods of storage are referred to as D (air-dry), F (over fresh water), and S (over salt water). The desiccators were kept in the dark at room temperature. The germination tests were carried out in Copenhagen tanks, run at 30° C constant temperature using normal seed-testing technique, as previously described, Nelson (1927). Each actual germination test consisted of 50 " seeds " divided,

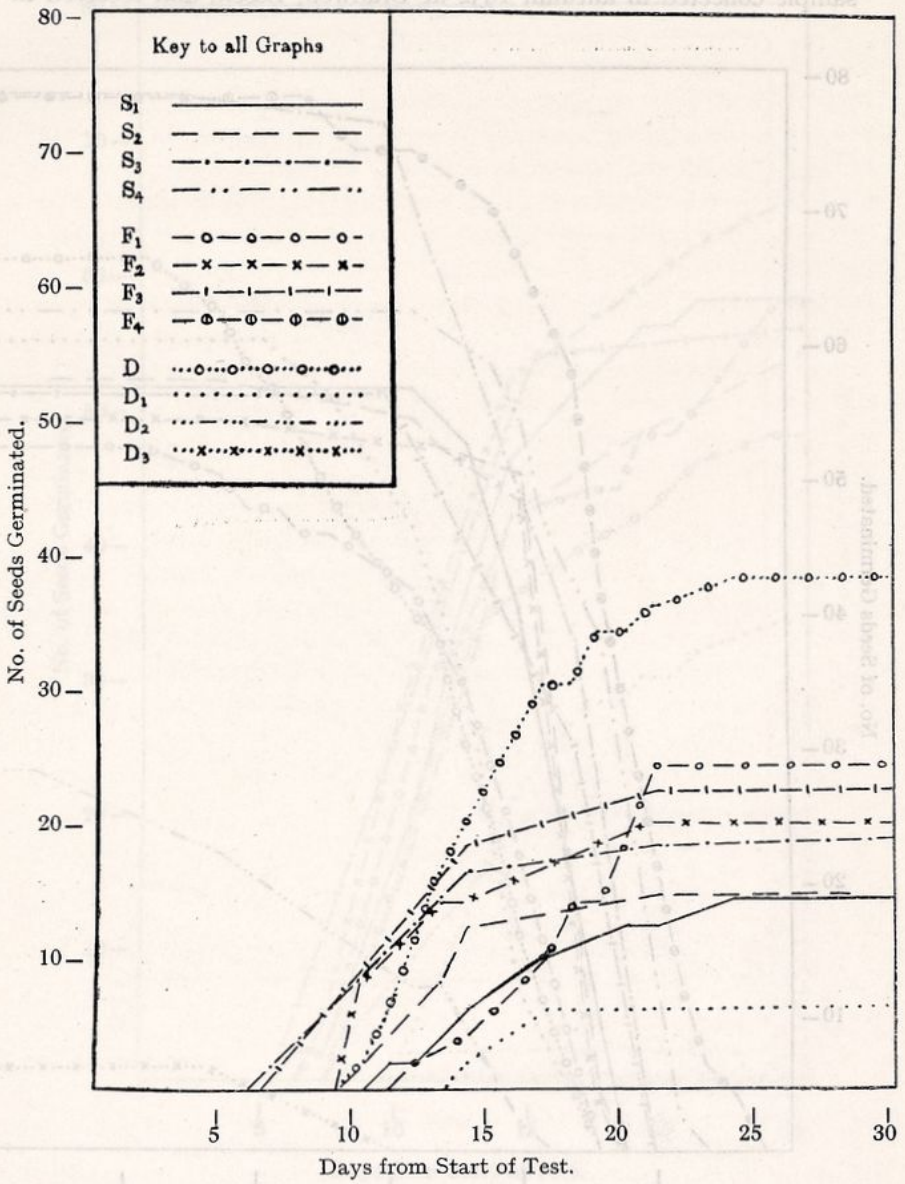
25 " seeds " on each of two pads, and continued for 25 days. Only " seeds " which by touch appeared to have a fully developed caryopsis



GRAPH A.

were selected from the stored bulk for test. The pads were examined periodically, usually every day, and " seeds " showing the tip of either

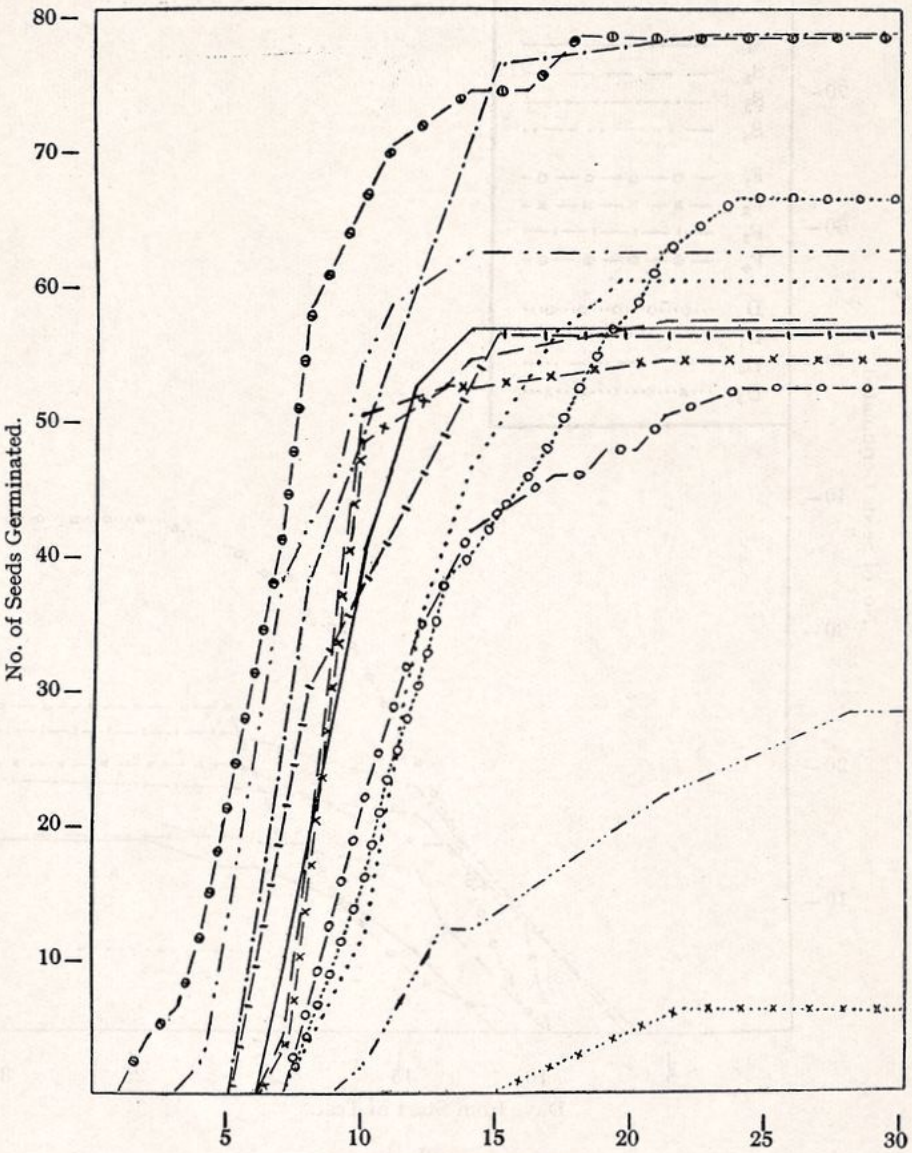
shoot or radicle were removed: in this way a graph was obtained showing the rapidity of germination as well as the total.



GRAPH B.

The moisture content of the seeds was determined by drying 10 seeds for twenty-four hours at approximately 100° C. (Table 1).

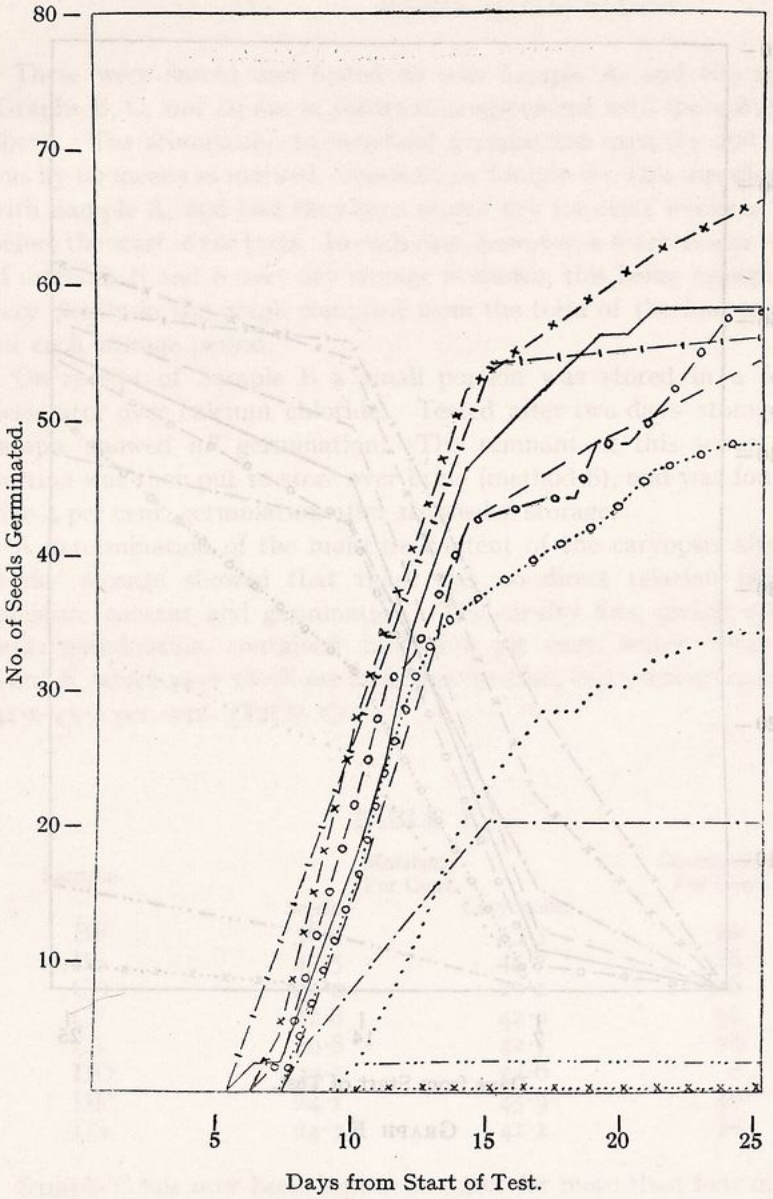
Preliminary work was carried out on a sample designated A, a small sample collected in autumn 1932 at Bradwell, Essex, and received in



GRAPH C.

January 1933. A test of the germination capacity of the seed as received was first made and the remaining seeds were divided into three

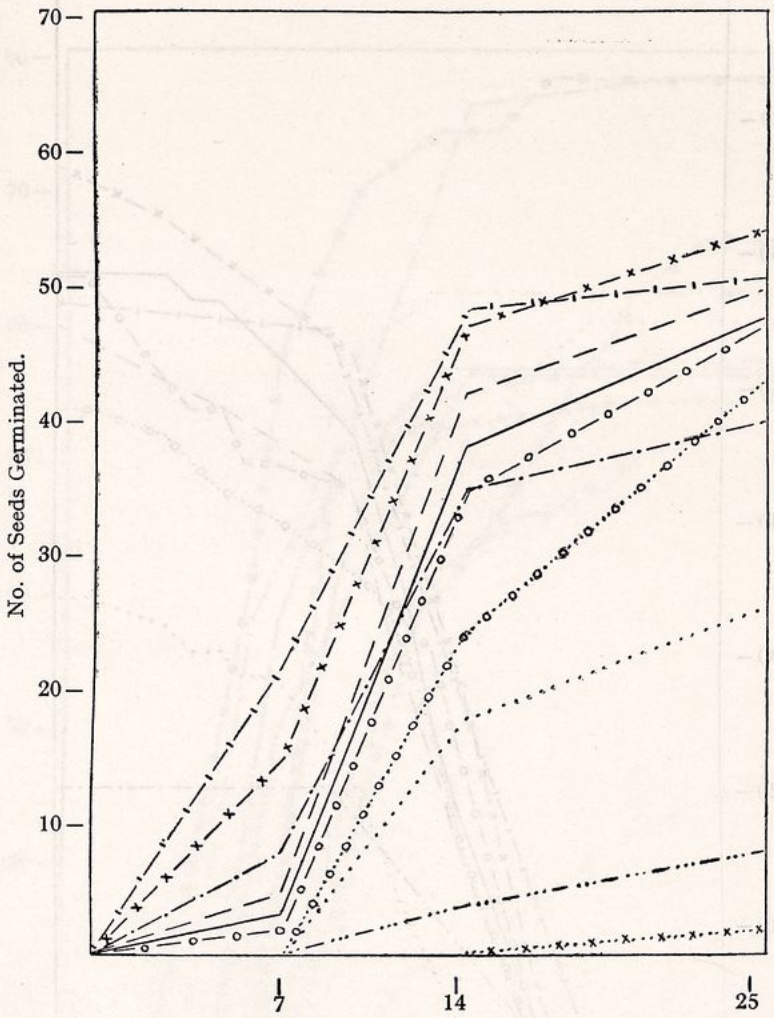
lots and stored as D, F, and S respectively (see above). A sample was taken from each stored lot every fortnight and tested for germination.



GRAPH D.

The results, shown in Graph A, indicate that not only is the total germination capacity increased in lots S and F, but the speed of

germination is also increased, this continues up to about the fourth week of storage and then both show a slight decrease. Meanwhile the



GRAPH E.

air-dry sample has dropped to *nil* germination in four weeks from the time of being received. The seeds stored over brine remained cleaner and brighter throughout the period than those stored over fresh water, but both showed an amount of fungal growth.

In February 1933 three further samples were received from Chelmsford.

Sample B collected 31.11.32, Bradwell.
,, C ,, 4.1.33, ,,
,, D ,, autumn 1932, in Holland.

These were stored and tested as was Sample A, and the results (Graphs B, C, and D) are in substantial agreement with those outlined above. The stimulation to increased germination capacity and speed was by no means so marked, especially in Sample B : this was identical with Sample A, and had thus been stored dry for eight weeks at least before the start of the tests. In each case, however, a marked superiority of methods F and S over dry storage is shown, this being brought out very clearly in the graph compiled from the total of the four samples for each storage period.

On receipt of Sample B a small portion was stored in a fourth desiccator over calcium chloride. Tested after two days' storage this sample showed *nil* germination. The remnant of this super dried portion was then put to store over brine (method S), and was found to give 4 per cent. germination after six weeks' storage.

A determination of the moisture content of the caryopsis after six weeks' storage showed that there was no direct relation between moisture content and germination. The air-dry lots, giving 0–6 per cent. germination, contained 24·6–26·1 per cent. water, while lots S and F, which gave 18–78 per cent. germination, had a water content of 41·1–45·9 per cent. (Table 1).

TABLE I.

Sample.	Moisture Per Cent.		Germination Per Cent.
	"Seeds."	Caryopses.	
BF	38·3	43·3	22
BS	43·5	45·7	18
CD	20·2	26·1	6
CF	22·8	42·0	56
CS	26·8	42·7	78
DD	33·5	24·6	0
DF	24·1	45·9	56
DS	24·7	41·1	20

Sample C has now been kept over water for more than four months and still gives a germination up to the original value ; no significant difference is shown in any sample between methods F and S for storage. The attempt to store the seed dry and restore the germination capacity by storage over water gave negative results, and an attempt was made to devise a method to maintain the moisture content at 45 per cent. and yet preserve the seed in good condition free from moulds.

Owing to a paucity of seed only four methods of storage were employed. A portion of Sample C, which had been stored over water since February, was divided into four parts on 25th May. The germination at that date being 78 per cent. The four portions were put in store in different ways. The first was placed in moist air in a tube and the tube sealed; the second was placed in moist CO_2 in a sealed tube; the third was placed in a sealed tube over 10 per cent. gelatine; while the fourth was dried and sealed in an atmosphere of dry CO_2. After eight weeks, i.e. on 21st July, the seed from each of the tubes was tested. The seed stored in moist air gave 46 per cent.; in moist CO_2 28 per cent.; over gelatine 28 per cent.; and in dry CO_2 40 per cent.

The growth of mould on each set was negligible, but the dry sample in CO_2 was freer than the others, making for easier handling. It would thus appear that seed of *Spartina Townsendii* may be stored by a method suitable for transport by mail, etc., without loss of vitality. Further tests of storage methods and covering periods more extensive than those reported here will require to be carried out.

We are indebted to Miss B. G. Watts for the production of our graphs in their present form.

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