

# Some 30-Year Tests on Germination of Alfalfa and Clover Seed

By

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**SEVERAL SEED SAMPLES** of alfalfa, sweet clover and red clover were set aside in the fall of 1913, for length of life tests in the seed laboratory then conducted under the Experiment Station. These samples were, and still are, stored in ordinary seed envelopes in a ventilated metal box in the laboratory. During the first year they were tested monthly, then yearly, and after some years only at intervals of several years. A 20-year report on these and other samples was published in the Journal of Agricultural Research for December 15, 1935. Recently, another test has been made on these samples in cooperation with the State Seed Department, and the following summary of results to date is presented:

Germination at intervals over a 30-year period

Sample No.	Kind	Source	Original percent hard seed	Percent of germination						Percent of hard seed after 30 yrs.
				1914	1920	1924	1929	1934	1943	
14358	Alfalfa	N. D.	33	64	70	69	55	55	42	4
14397	"	N. D.	38	59	72	68	71	64	48	tr
14407	"	S. D.?	32	67	79	72	65	55	37	1
14469	"	S. D.	3	96	81	78	81	82	70	0
14487	"	Turkestan	4	95	95	86	85	75	64	1
14497	"	Montana	16	79	53	59	53	54	45	3
14295	Sweet clover	Mo.?	35	59	32	28	22	26	7	25
15093	"	Kansas	27	68	71	69	58	48	13	17
14446	Red clover	N. D.	35	62	56	46	32	16	1	10
14448	"	N. D.	12	83	40	39	17	7	2	5

The tests were made in the standard method, between blotting paper in a germination chamber at 20°C (68°F). They were continued for seven days, two days longer than the usual period, to secure further judgment on some of the questionable sprouts. In general, soil tests will run somewhat lower than blotter tests, because of mechanical resistance of soil and

injury by soil fungi. Comparative soil tests and field plot tests were presented in the earlier report.

The occurrence of "hard" seeds in clovers has been recognized for a very long time. Such seeds are impermeable to water and remain in their dry, hard condition after having been in the wet blotters or in water for a period of time. This is one of

many conditions which result in dormancy or delayed germination. It has been fully demonstrated that such "hard" seeds will germinate promptly if the seed coat is slightly broken as in the process of scarifying. Severe scarifying, however, causes injury to the embryo of the seed and results in loss of vitality in ordinary storage of a year or so after scarifying.

The hard condition in alfalfa seed is rather temporary and while often high in freshly harvested seed, usually becomes much lower by late spring during ordinary storage. This accounts for the higher germination shown by the first three samples even after five years time. This is not true of sweet clover, and it will be observed in the above table that more than one-half of the hard seeds in the two sweet clover samples remained still hard after 30 years.

Thus, during storage, some hard seeds gradually lose this character and those which were not hard tend to dry out and lose their capacity to germinate. Two samples of alfalfa which had a very low initial content of hard seed, were included for comparison. Experience had shown that the imported Turkestan seed had a very small amount, and sample No. 14487 came from a wholesale dealer. Sample No. 14469 came from a grower at Formosa, South Dakota, but further history is un-

known. The two samples of sweet clover came from wholesale dealers. The plant was grown very little at that time and these samples might not fairly represent present samples, though later tests have shown persistence of the hard character in sweet clover.

The fact that the two samples which had a low initial content of hard seed retained their capacity to germinate the best, is of special interest but cannot be readily explained. It is evident that length of life depends upon the natural characteristics of the particular lot as well as upon its handling in harvesting and threshing and upon conditions at storage.

The reader may wonder how the sprouts from these old seeds looked as compared with those of ordinary fresh seeds. The alfalfa seedlings looked remarkably natural and scarcely any of the samples showed as much as five percent of what were regarded as imperfect sprouts which should not be counted as germinated. The sweet clover samples gave 12 and 25 percent of imperfect sprouts and in general, appeared poor but this cannot now be accurately compared with their original behavior. The red clover seeds were obviously dead and it will be observed that the capacity of these samples to germinate had declined steadily from the beginning.

**J. A. Munro**, Entomologist, in charge of the Station research on beekeeping, finds that good winter protection of hives will reduce the daily hive weight loss by as much as 61%. Delay in providing winter protection in the fall results in increased consumption of honey by the bees and lessens the colony's chance of winter survival.