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**Bur Clover Seed; Means of Hastening
Their Germination**

By

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and

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Bur Clover Seed; Means of Hastening Their Germination

BY

J. F. DUGGAR, Director,

and

H. B. TISDALE, Assistant in Agriculture.

The seed of the Southern species of bur clover (*Medicago Arabica* or *M. maculata*) has heretofore germinated very slowly and imperfectly. This is due to the fact that practically all bur clover seed of the Southern species is sowed in the unhulled condition. It is usually found necessary to sow unhulled bur clover seed several weeks earlier than the seed of any other winter-growing legume, for there must usually elapse four to eight weeks after sowing before many of the seed germinate. Indeed, this delay in germination often results in very imperfect stands or in such late germination that the very young plants are destroyed by cold.

With a view to hastening the germination of bur clover seed, experiments were begun by the Agricultural Department of the Alabama Experiment Station last winter, and these chemical treatments were effective in hastening germination.

Later, information reached us that Mr. A. D. McNair, Little Rock, Arkansas, had hastened the germination of bur clover seed by "scalding." However, the writers had no information as to the temperatures or other details employed until after our own experiments here recorded were well under way.

At the Alabama Experiment Station germination experiments were made in August, 1914, some of which are still incomplete. But they have progressed far enough to justify a preliminary statement and recommendation, which is now issued in order to be helpful to those who will sow bur clover this fall. Certain of these germination tests were made by planting the burs in the soil and others by sprouting the seed between layers of damp cloth.

Percentage of Burs Containing Sprouted Seed, Germinated Between Damp Cloths, August, 1914.

No. hours soaked in water at room temperature	No. minutes soaked in hot water	Temperature of hot water	No. days after sowing when counted	Percentage of burs with sprouted seed
SERIES I				
No soaking	No scalding	-----	21	6
No soaking	1 min.	160° F.	21	11
No soaking	1 min.	140° F.	21	13
No soaking	1 min.	212° F. (Boiling)	21	51
SERIES II				
No soaking	No scalding	-----	9	8
2½ hours	1 min.	212° F. (Boiling)	9	53
2 hours	1 min.	212° F. (Boiling)	9	59
3 hours	1 min.	212° F. (Boiling)	9	62
4 hours	1 min.	212° F. (Boiling)	9	76

Percentage of Burs Containing Sprouted Seed; Planted in Soil August, 1914.

TREATMENT			RESULTS	
No. hours soaked in water at room temperature	No. minutes soaked in hot water	Temperature of hot water	No. days after sowing when counted	Percentage of burs with sprouted seed
SERIES III				
No soaking	No scalding	-----	21	4
No soaking	1 min.	140° F.	21	6
No soaking	1 min.	180° F.	21	10
No soaking	1 min.	212° F. (Boiling)	21	52

It should be noted that in one experiment only 8 out of 100 burs had germinated at the end of nine days, where no special treatment was given; but in the same time 76 out of 100 burs had sprouted where the burs had been soaked for four hours in water at room temperature and then kept in boiling water for one minute.

All of our other experiments point in the same direction.

Even the above figures do not represent all the benefit of treatment, for it was noted that more seed sprouted from each germinated bur that had been treated than from each untreated but "germinated" bur.

Effect of Drying Out of Soaked Seed.—In all cases in these experiments the scalded or soaked burs were thoroughly dried (for from 30 to 40 hours) before being planted. It is easier to sow the burs while still wet, but the burs may be sown either while wet or after being rapidly dried.

Scalding Permits Later Sowing.—Heretofore, it has been considered risky to sow Southern bur clover seed much after the middle of September in central Alabama. By employing the washing and scalding process it becomes safe to continue for several weeks longer the sowing of the burs, or up to a date as late as is safe with the seed of crimson clover—say up to the first week in October in central Alabama. This extension of the sowing season gives opportunity to select for sowing bur clover a time when soil moisture conditions are favorable. Scalding also affords better stands and economizes these expensive seed. However, to insure a full stand we would advise not less than three bushels even of scalded seed.

This Station has soaked and scalded a large amount of bur clover seed in bulk, and suggests the following procedure in thus preparing large amounts of seed:

(1.) Soak each sack of burs in water at room temperature for at least two hours, stirring them so as to wash out as much mud as possible for later use in re-inoculating the same seed (as under 5 below).

(2.) Then dip each sack of seed for a very few minutes into a barrel of very warm or hot water (say 140 to 160 degrees Fahr.) so as to avoid too great cooling of the boiling water into which the seed are to be dipped later.

(3.) In a pot of water, kept boiling, dip the still warm seed for one minute.

(4.) Immediately dip the hot seed into cool water.

(5.) Now dip the cool seed in that cool water in which the dry seed had first been placed (See No. 1 above). This is for the purpose of re-inoculating the seed. To this inoculating water may also be added either (1) soil from a field of bur clover or alfalfa, where the plants have been healthy, or (2) pure cultures artificially prepared for inoculating bur clover.

The fifth recommendation is made on the assumption that the nitrogen-fixing bacteria lodged on the dry burş may have been killed by exposure for one minute to boiling water. This assumption has not been proved, but re-inoculation is advised as a matter of safety until experiments now under way at this Station determine whether this short exposure to boiling water makes re-inoculation necessary.

If the amount of seed to be scalded is large, it is important either to select dry weather for this treatment, so as to be able to dry the seed thoroughly so as to prevent germination before the seed are sown; or else to sow the seed soon after treatment while still wet, and preferably in damp soil.

Prompt drying of the seed (except for those sown in very damp soil) is believed to be the main precaution needed.

Scalding is regarded as more important than the preceding soaking. Indeed, the soaking may be omitted; and it probably should be omitted if there is any danger that the seed may remain undried in the air for any considerable time after being scalded. Certainly the seed should not be allowed to swell and soften before planting.