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Seed Germination after Mixing with Fertilizers

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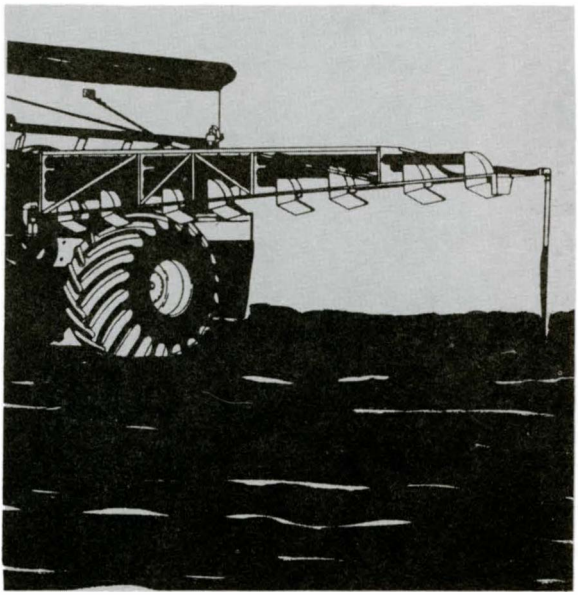
SEED GERMINATION

after mixing with fertilizers



Agricultural Experiment Station
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If a 2-day soaking rain starts during seeding and you have to pull out of the field, what do you do with the mix left in the box? How long can small grain or alfalfa seed be mixed with fertilizer before germination is affected?

We used wheat, oat, barley, and alfalfa seed and seven fertilizers in germination tests to find more precise answers than we've had to this point.

Methods

Seed was chosen randomly and does not reflect specific cultivars.

The dry fertilizers were urea (46-0-0), muriate of potash (0-0-60), triple superphosphate (0-46-0), di-ammonium phosphate (18-46-0), and ammonium nitrate (34-0-0).

The two liquid fertilizers were ammonium polyphosphate (10-34-0) and urea ammonium nitrate (28-0-0).

Fertilizer and seed were mixed in a ratio (based on volume) of two parts fertilizer to one part small grain and 10 parts fertilizer to one part alfalfa seed. These ratios are based upon rough estimates of seeding rates when broadcast planting.

Dry mixtures were stored in plastic germination boxes with lids, and no moisture was added. The wet mixtures were stored in uncapped flasks. Temperatures during storage were approximately 20-25 C (room temperature).

After the different storage periods, we ran a standard germination test on all samples, following methods of the Association of Official Seed Analysts. The tests were run with a check (no storage) sample for comparison, and consisted of two replicates.

Results

The information in Tables 1-5 suggests that there are limitations on combining seed with fertilizer.

Table 1. Wheat: germination results when mixed with dry fertilizer and wheat seed (2:1, v:v).

Dry fertilizer N - P - K		Number of days mixed 7	5	3	2
		Germination percentage			
46-0-0	Check	88			
	Mean	86			
0-0-60	Check	89			
	Mean	87			
0-46-0	Check	89	96	95	96
	Mean	28	52	81	95
18-46-0	Check	89			
	Mean	87			
34-0-0	Check	89			
	Mean	87			

Table 2. Oats: germination results when mixed with dry fertilizer and oat seed (2:1, v:v).

Dry fertilizer N - P - K		Number of days mixed 7	5
		Germination Percentage	
46-0-0	Check	96	
	Mean	95	
0-0-60	Check	96	
	Mean	97	
0-46-0	Check	96	97
	Mean	78	95
18-46-0	Check	96	
	Mean	95	
34-0-0	Check	96	
	Mean	96	

Table 3. Barley: germination results when mixed with dry fertilizer (2:1, v:v).

Dry fertilizer N - P - K		Number of days mixed 7	5	3	2	1
		Germination percentage				
46-0-0	Check	96				
	Mean	94				
0-0-60	Check	96				
	Mean	95				
0-46-0	Check	96	97	94	94	94
	Mean	25	75	85	84	93
18-46-0	Check	96				
	Mean	96				
34-0-0	Check	96				
	Mean	96				

Triple superphosphate (0-46-0) in the dry form had detrimental effects on the germination of wheat, oats, and barley. It had no effect on alfalfa. The liquid urea ammonium nitrate (28-0-0) had a detrimental effect on alfalfa.

We don't know why germination drops when seed from some crops is left mixed with a certain fertilizer for a period of time. It is possible that some cultivars may have more susceptibility than others.

We suggest that conditions more closely match actual on-farm storage facilities in any further tests.

Table 6 shows our recommendations, as based on standard germination tests. These recommendations indicate the length of time that seed and fertilizer may be mixed without significant germination damage.

Table 4. Alfalfa: germination results when mixed with dry fertilizer (10:1, v:v).

Dry fertilizer N - P- K		Number of days mixed 7 Germination percentage
46-0-0	Check	81
	Mean	83
0-0-60	Check	83
	Mean	83
0-46-0	Check	81
	Mean	81
18-46-0	Check	81
	Mean	82
34-0-0	Check	81
	Mean	78

Table 5. Alfalfa: germination results when mixed with liquid fertilizer (10:1, v:v).

Liquid fertilizer N - K - P		Number of days mixed 7	5	3	2	1	.5
		Germination percentage					
28-0-0	Check	81	80	80	77	81	78
	Mean	54	37	58	61	64	83
10-34-0	Check	81					
	Mean	80					

Table 6. Recommended maximum days for combining various crop seed with selected fertilizers for use in broadcasting.

Crop seed	Fertilizer		Maximum days
Wheat	46-0-0	dry	7
	0-0-60	dry	7
	0-46-0	dry	2
	18-46-0	dry	7
	34-0-0	dry	7
Alfalfa	46-0-0	dry	7
	0-0-60	dry	7
	0-46-0	dry	7
	18-46-0	dry	7
	34-0-0	dry	7
	28-0-0	liquid	0.5
	10-34-0	liquid	7
Oat	46-0-0	dry	7
	0-0-60	dry	7
	0-46-0	dry	5
	18-46-0	dry	7
	34-0-0	dry	7
Barley	46-0-0	dry	7
	0-0-60	dry	7
	0-46-0	dry	1
	18-46-0	dry	7
	34-0-0	dry	7

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