

# Exp M Effect of chemicals on germination

Jan 12 1970 <sup>Dry</sup> Seeds soaked in 1% solution of all 12 chemicals below <sup>for 2hrs</sup> Germinated under hood in lab at temp ave 74°F. Into germ at 4:30P

Good reactions ✓

Chemical	Reaction (Jan 15)	Reaction (Jan 16)	Reaction (Jan 16)
① Thiourea	about 70% ger. Conc. too high		
2 Urea	No apparent growth		
② 3 Na <sub>2</sub> S <sub>2</sub> O <sub>4</sub> (50 seeds)	good reaction	10 ger	17 tips 23 no ger
4 Ascorbic acid	No growth		
5 Riboflavin	" "		
6 Glutathione	Plumping? Tips		
7 Nicotinic acid	" " ? Tips		
8 Dithiothreitol	No growth		
9 Thioacetic acid	Plumping? Tips		
③ 10 Cysteine	Definite reaction	3 <sup>rd</sup> best reaction	some
11 Mercaptoethanol	Plumping Tips		No growth
12 Mercapto-1-propanol	" " Tips		No growth

✓ ① = Best ② = Second best ③ = Third best

✓ <sup>2</sup> Seeds soaked in water for 12 hours and then in 1% Thiourea for 3 hrs @ 77°F gave about 90% ger. Root growth more healthy than in 1. above

Plan Repeat with 0.1% solutions. Also soak seed in H<sub>2</sub>O for 12 hours ±, then into solutions for 4 hours, then germinate at 77°F

# Exp M. Chemicals - Results

Jan 26 1970

Thiourea 0.1%  
Soaked seed  
Dry seed

20% ger solution too weak  
No germination " " "

Thiourea 0.5%

Soaked seed (5 days) Into Thiourea Jan 24 11:00 AM  
Out Jan 25 6:00 AM, 19 hrs in Thio.

(53)

Germination in lab.

Jan 26 11:00 AM  
" 27  
" 28 12:30 P  
" 29

No Cum %  
3  
40 43  
8 51

Ger. time  
29 hrs

Jan 28

No root hair development yet.

Jan 29

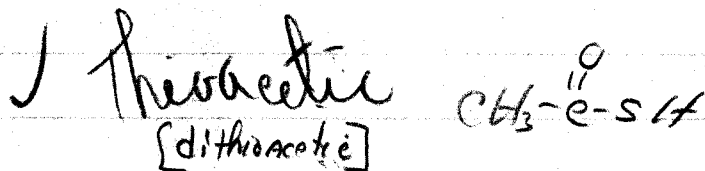
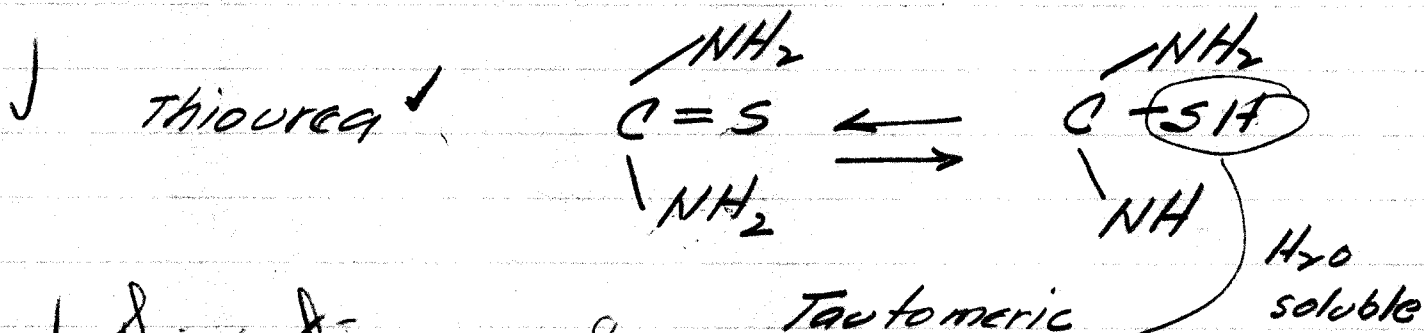
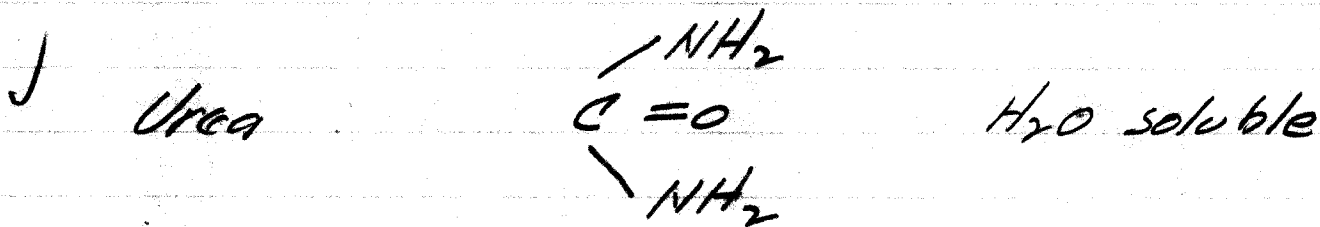
" " " " Roots stunted. Hypocotyls  
60 to 75% of length of radical.

Grow in soil

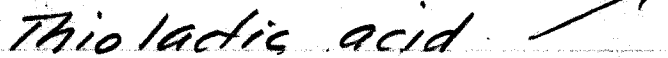
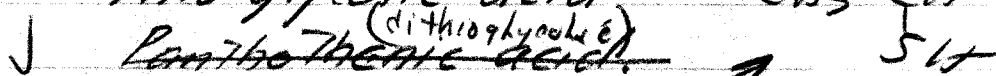
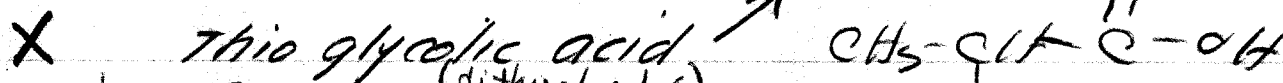
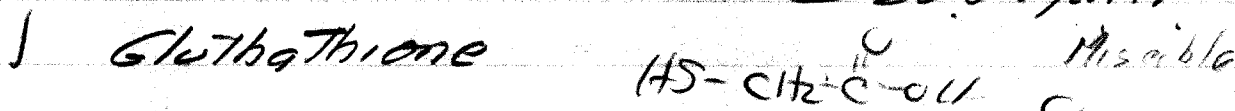
Tried 0.3% solution

Date	Time	Thiourea	Cysteine	H <sub>2</sub> Sol	Thioacetic
Feb 4		Seed into solutions for 3 hours		after soaking in H <sub>2</sub> O 24hrs	
Feb 4	9:30	Into germ 70°F lab table			
" 8	9:00 AM	Solution too weak for soaked seed	Promising	Promising	No reaction
" 10		" " "	2 Try dry seed.	Solution may be too strong	No reaction

# Oxidation



Sulphydryl



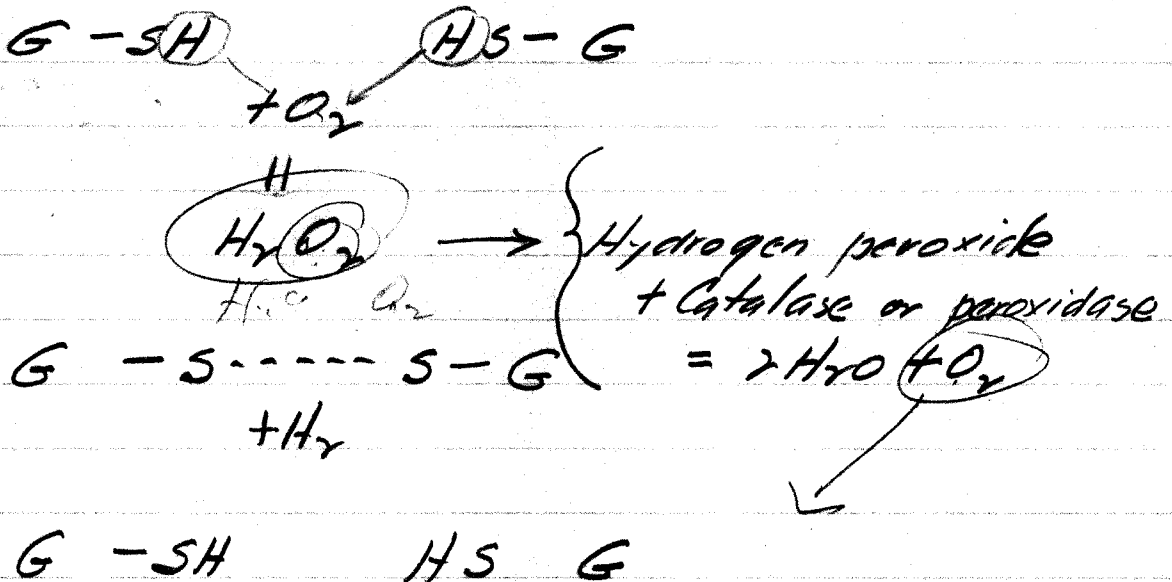
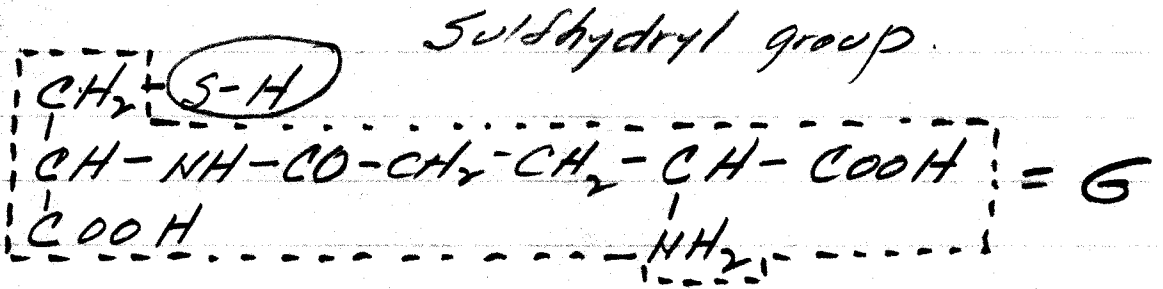
Nicotinic acid (oxid.)

X ✓ Riboflavin (oxid)  $\text{B}_2$  } Vitamins B complex

X Thiamine (oxid)  $\text{B}_1$  }

✓ Vitamin C = Ascorbic acid

Oxidation - page 191 + Balansty  
 Glutathione



$$\frac{\text{CO}_2}{\text{O}_2} \quad \text{Respiratory quotient}$$

Sugar = 1

Low  $\text{O}_2$  in  $\rightarrow$  Fat =  $> 1$   $0.7 \pm$

High  $\text{O}_2$  in  $\rightarrow$  Malic acid =  $< 1 = 1.33$

- |    |                                   |   |                         |
|----|-----------------------------------|---|-------------------------|
| ✓✓ | DiThio threitol                   | ✓ | Cysteine (Need cystine) |
| ✓✓ | $\text{Na}_2\text{S}_2\text{O}_4$ | ✓ | 2 Mercaptoethanol       |
| ✓✓ | Ascorbic acid                     | ✓ | Nicotinic               |
| ✓✓ | Riboflavin                        |   |                         |
| ✓✓ | Gluthathione Reduced              |   | { Fungus control        |
| ✓✓ | <u>Thioacetic</u>                 |   | thimerosal              |
| ✓✓ | Thiourea                          |   |                         |
| ✓✓ | Urea                              |   |                         |

Notes Exp M Chemicals

January 16/70 95°F inhibited growth of seed  
treated with 1% thiourea  
Exps with A B  
77°F 95°F

# Chemical solutions prepared

	Percent	Chemical	Date prepared
1	5	Thiourea	Jan 7 1970
2	5	Urea	" "
3	5	$\text{Na}_2\text{S}_2\text{O}_4$	" "
4	5	Ascorbic acid	" "
5	2.5	Riboflavin	" "
6	5	Glutathione (reduced)	" "
7	5	Nicotinic	" "
8	5	Dithiothreitol	" "
9	5	Thioacetic acid	" "
10	5	Cysteine	" "
11	5	Mercaptoethanol (fungicide)	" "
12	5	propanol	" "

Nov 1963 3% Thiourea 8 minutes

# Thiourea check on Sus. Summit Seed

Jan 10 1970  
 8:55 AM Started soaking 24 seeds } in 1% Thiourea } soaking time  
 11:55" Drained seed and put in 77°F } 3 hours }  
 for germination without drying

Jan 11 8:00 AM Tips beginning to show

" 12 1:00 PM { 10 germinated  
                   { 8 tips  
                   { 6 no sign growth

" 13 4:30 PM { 18 germinated  
                   { 3 tips  
                   { 3 no sign growth

14 8:30 AM { 18 " " "  
                   { 3 " " "  
                   { 3 " " "

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Jan 12/70 Soaked seeds in water first for 12 hours  
 then into 1% Thiourea for 3 hours. Into  
 germination @ 77°F at 3:30 PM Jan 12/70

(35) (35)

Jan 14 11:00 AM 18 germinated (Looks healthy growth)  
 10 tips  
 7 no growth (absolutely)

Try 0.1% Thiourea solution



Thiourea treated seed  
Neal - Newman

Collected 1969 Lassen Co  
Claim "good germination"

Wetted and germination by ALH  
Sept 17 / 1970

Approx germination  
10-15%

Check germination in sand  
Compare with strat-dried seed.