

- Note Green lines

cover headings for which ⁽¹⁾ experimental data is entered as each sample is processed

Hormay ⁽¹⁾

Experiment Soak (Sk) A'78 Continuous soaking same H₂O

Into Soak ⁽¹⁾		Out of Soak		Note! 45 cc of H ₂ O used to soak seeds in all samples	
Seed Soaking Time					
Sample No	Into H ₂ O	Out of H ₂ O	Seaking time		
	Date Time of day	Date Time of day	Code(1) No	Code(2) No	Minutes
1	Febr 6 8:25 AM	2/6 8:26 1/4			1.25 ✓
2	Feb 7 7:46 AM	Feb 7 7:48 1/2			2.5 ✓
3	Feb 7 8:32 1/2 AM	Feb 7 8:37 1/2			5 ✓
4	Feb 7 9:15 AM	Feb 7 9:25 A			10 ✓
5	Feb 7 9:50 AM	Feb 7 10:10 A			20 ✓
6	Febr 1 2:35 PM	Febr 1 3:05 PM			30 ✓
7	" " 1:25 PM	" 2:25 PM			60 (1 hr) ✓
8	Feb 7 10:35 A	Febr 7 12:35 PM			120 2 ✓
9	" 10:40 A	" 1:40 P			3 ✓
10	" 10:41 A	" 2:41 P			4 ✓
11	Feb 8 9:00 A	Feb 8 2:00 P			5 ✓
12	Febr 2 7:45 A	2/2 1:45 P			6
13	" "	" 2:45 P			7
14					8
15					16
16	Febr 2 7:45 A	2/3 7:45 A			24 (1 day)
17	Febr 9 10:43 A	Febr 9 10:43 A			2 ✓
18					3
19					4
20	Febr 8 2:?	Febr 8 4:15 P			5 ✓
21					6
22					7
23					

A & B below soaked at 35°F Lab 2

(A) Febr 13

Febr 13 4:15 P

5 hrs

(B) Febr 13

27

28

29

30

(2)

Hornay (2)

Experiment Soak (Sk) A'78 Continuous soaking same H₂O

(2) Seed Weight (Grams)							
Sample	Dry Seed			Wet Seed			Dried seed
	Dish + Seed	Dish	Seed	Dish + Seed	Dish	Seed	
1	50.140	40.140	10.00	50.900	40.140		49.70
2	42.660	32.660	Note 1	43.370	32.660		
3	37.670	27.670	10.9 grams	39.040	27.670		
4	42.165	32.165	at seed	44.150	32.165		
5	45.470	35.47	used in	48.320	35.47		
6	41.705	31.705	all samples	45.600	31.705		
7	49.320	39.320		54.360	39.320		
8	40.040	30.046		46.245	30.040		
9	37.845	27.845		44.620	27.845		
10	35.720	25.720		42.420	25.720		
11	46.900	36.900		53.840	36.900		
12	41.84	31.84		48.75	31.84	16.91	
13	47.82	37.82		54.73	37.82	16.91	
14							
15							
16	41.410	31.410		48.36	31.410		
17	38.375	28.375		45.06	28.375		
18							
19							
20	41.410	31.410		47.71	31.410		
21							
22							
23							
24							
25 A		35.33		49.57			
26 B		38.17					
27							
28							
29							
30							
(5P)	49.76	39.26		55.78	39.26		

③

Experiment Soak (Sk A'78 Continuous soaking same H₂O

[illegible]

(4)

Hormay

(4)

Experiment Soak (Sk) A'78 Continuous soaking same H₂O

(4) Aeration				Note: 10 cc liquid used in all samples Aeration in 100 cc graduate cylinder			
Sample No	Air 15 sec	Foam reading cc	Description	Air 30 sec	Foam reading cc	Description	
1		Trace			Trace	Some bubbles holding fleetingly	
2		"			"	" " " "	
3		"			"	" " " "	
4		25			29	Ring L bubbles holding 1 mi	None in 2 mi
5		30			33	" " " "	1 bubble 2 mi
6		33			33	35% L, 5 bubbles after 1 minute	
7		40			40	66% " " " "	2 cc 2 mi
8		50			75	3 cc large bubbles in graduate	
9		60			90	5 cc " 1 mi; 4 cc → 2 mi	
10		65			87	2 cc " 1 mi Ring L bubbles 2 mi	
11		125+	Flowed over top				
12		70			100+	Over top of graduate	
13		70			100+	" " "	
14							
15							
16		75			135	Over top	
17		65			110	1/2 top 2 cc 2 mi	
18							
19							
20		108			135+	Practically all converted to foam	
21							
22							
23							
24							
25 A		35			40	50% 1 mi	
26 B							
27							
28							
29							
30							

Hormay

(5)

(5)

Experiment 5a (Sk) A'78 Continuous soaking same H₂O

10cc liquid										
(5) Color Concentration										
Sample No	Non-acidified liquid					Acidified liquid (✓)				
	Not diluted	Diluted	DV	Not diluted	Diluted	Not diluted	Diluted	DV	Not diluted	Diluted
	Trans.	Absorb	Trans	Absorb	Factor	Trans	Absorb	Trans.	Absorb	Factor
1	84.20	.076	—	—	—	84.50	0.075	—	—	—
2	85.50	.0700	—	—	—	86.00	0.070	—	—	—
3	83.20	.0820	—	—	—	82.50	0.085	—	—	—
4	80.00	.098	—	—	—	70.50	0.150	—	—	—
5	81.50	.090	—	—	—	60.20	.220	—	—	—
6	69.90	.159	—	—	—	38.00	0.422	—	—	—
7	46.20	.335	—	—	—	13.90	0.865	—	—	—
8	39.50	.410	—	—	—	—	—	60.5	0.22	5
9	29.20	.640	63.50	0.200	2	—	—	40.0	0.40	4
10	—	—	59.00	0.230	2	—	—	50.0	0.295	6
11	—	—	31.00	.15	*15 1	—	—	59.5	.275	8
12	10.25	.900	54.00	.265	3	1.00	1.85	36.8	.435	6
13	—	—	59.5	.223	3	—	—	37.5	.425	6
14	—	—	—	—	—	—	—	—	—	—
15	—	—	—	—	—	—	—	—	—	—
16	—	—	51.5	.285	8	—	—	60.0	.222	20
17	—	—	48.5	.325	5	—	—	37.0	.430	9
18	—	—	—	—	—	—	—	—	—	—
19	—	—	—	—	—	—	—	—	—	—
20	—	—	49.0	.31	5	Filtered →	—	57.5	.240	16.5
21	—	—	—	—	—	—	—	—	—	—
22	—	—	—	—	—	—	—	—	—	—
23	—	—	—	—	—	—	—	—	—	—
24	—	—	—	—	—	—	—	—	—	—
25	—	—	—	—	—	—	—	—	—	—
26	—	—	—	—	—	—	—	—	—	—
27	—	—	—	—	—	—	—	—	—	—
28	—	—	—	—	—	—	—	—	—	—
29	—	—	—	—	—	—	—	—	—	—
30	—	—	—	—	—	—	—	—	—	—

D factor = Number of 5cc units of H₂O added to 5cc liquid solution

(✓) 10cc liquid acidified with 1cc normal HCl

Exp. Soak A-78 Materials and procedure

Treat seeds in 50 ml graduated test tubes
Put 10 grams of seed in a test tube. This
constitutes a sample. i.e. Sample No 1, No 2
etc.

Total no. of samples? Mark each test tube with sample No and
experiment Example } No 1
Soak A-78

Measure out 45 cc of distilled water
and put in separate test tubes and have
ready for adding to the seeds when
time to start seeds soaking.

Mark and weigh Petri dishes for weighing and drying
start experiment samples

Record
date, time
(Heading)

Add 45 cc of water to each
sample of seeds - as quickly as possible
Cork each test tube and shake
Lay test tubes horizontally so seed
does not compact on one end of the
test tube

Measurements on each sample

After the appropriate soaking time pour off the liquid in the test tube into a ^{capped t.t.} ~~beaker~~ and store on table temperature.

(2) Enter time "Seed out of H₂O" on form

"Dry" the seed for a minute or so on paper towels by rolling the seeds around on the towels

(7&8) Empty the seeds from the towels into a marked, ~~and~~ weighed, Petri dish

(6) Weigh the dish and contents and enter the weight on the form

(10&11) Put dish and contents into drier. Record the time.

Aerate 15 cc of liquid set aside in (2) above and record values (17), (18) and (19)

(13)~~12~~(14) Take sample out of drier. Record date
and time.

(20)(21) Run color tests on all samples
non-acidified and acidified solutions
Enter readings on The form.

5

Max absorption wave length = 505 ^{μm} microns
on wave length knob.

Start on zero knob left front ^{μm}

To make a reading

Insert blank (clear distilled H_2O)

Fill 50% $\pm$

Zero $\rightarrow$ 100% with light control
knob right front.

Sample readings

Top Trans
Red Bot Absorpt.

16.500

.775

55.0

.265

Exp Solution A-78

Objective Determine amount of solution of red pigment and gelatinous materials from bitterbrush seed with soaking in H_2O

Procedure

1. Put 10 grams of bitterbrush seed in test tube (50cc ^{graduated} capacity)
2. Add 50 cc of distilled water to test tube
3. Allow seed to soak for several days
4. Periodically pour off the water into a marked beaker and replace with fresh distilled water
5. Replace water on the following schedule after start of soaking

0.5	Start soaking	9:00 A
15 minutes		9:05 A
30 "		9:15 A
1 hr		9:30
2 "		10:00
3 "		"
4 "		12
5 "		1
6 "		2
7 "		3
		4

see next page

Jan 27/1978

Exp Solution A-78

Data Record

Sample Aeration Readings

No	Sinking time	Ht. Liquid mis	Max Ht Scum 15secs	Amount Scum 30secs	after 1 mi
Jan 27		cc	cc	cc	
9:05 A 1	5	21	28	28	Trace (perimeter)
9:15 2	15	22	27	28	0
9:30 3	30	22	29	29	0
10:00 4	1hr	22	30	30	0
11:00 5	"	22	60	70	100% large bubbles, but breaking down
12:00 6	"	22	65	80	Trace Ring small bubbles.
1:00 P 7	"	21	45	65	66% Small and large bubbles
2:00 8	"	22	35	60	50% Ring large bubbles
3:00 9	"	22	50	65	50% " " "
4:00 10	"	22	70	80	60% " " "
5:00 11	"	22	70	80	85% Large bubbles; 50% ring, 3 minutes

Samples

All above, "Scum" bubbles short lived. Disappeared

" in about 2 minutes after cessation aeration

Cont'd

Jan 30

8:10 A	23	50	60	5%	Hoff ring medium bubbles	
3:35 P	22	45	60	5%	Large bubbles 0% in 2 min	

5.

Schedule

No	Time of day (Sample H ₂ O out)	Soaking time	Soaking time in fresh H ₂ O
0	9:00 AM	0	0
1	9:05	5 mins	5 mins
2	9:15	15 "	10 "
3	9:30	30 "	15 "
4	10:00	1 hr	30 "
5	11:00	2 "	1 hr
6	12:00 Noon	3 "	1 hr
7	1:00 P	4 "	1 hr
8	2:00	5 "	1 hr
9	3:00	6 "	1 hr
10	4:00	7 "	1 hr
11	5:00	8 hr	1 hr

6. Check solution gelatinous material
by aeration 15cc in graduate cylinder
100 ml capacity

7. Check solution pigment
1cc N.HCl in 15cc soaking solution
using liquid used in 6 above

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (Sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No 1 (Sk time ^{1.25} mis - hrs - days)

Weight of seeds (grams) per sample

	Dry	Wet	Dried
⑦ Petri dish + seeds	50.140	50.900	
Petri dish	40.140		
Seeds	10.000		

Soaking treatment

	Date	Time	Code No	Minutes
① Into water 45 sec H ₂ O				
Out of water				
Soaking time				

Drying time and seed weight

	Date	Time	Code No	Minutes	Dish + seed wt
② Into drier	Feb 6	8:30 A			50.900
Dried weight 1	" 6	10:00 A			50.660
2					
3					

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)	Foam readings cc	Description
Aeration 15 seconds	Trace?	Yes } check against
" 30 seconds	"	} clear H ₂ O
60 secs after aeration	0	Some bubbles holding fleetingly

Color concentration in soaking water

spectrometer Readings

Soak water treatment	Transmission	Absorption
None	83.20 83.20	81.500 0.005 0.0900
Aerated (10cc)		
Acidified (10cc	83.500 78.000	0.050 0.110
with 1cc N HCl)	82.000	0.000

2/2/78
Hermay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from the seeds

Soaking treatment

Sample No 2 (Sk time ^{2.50} mis - hrs - days)

Weight of seeds (grams) per sample

	Dry	Wet	Dried
Petri dish + seeds	42.660		
Petri dish	32.660		
Seeds	10.000		

Soaking treatment

	Date	Time	Code No	Minutes
Into water				
Out of water				
Soaking time				

Drying time and seed weight

	Date	Time	Code No	Minutes	Dry wt seed
Into drier					
Dried weight					

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)	Foam readings cc	Description
Aeration 15 seconds		
" 30 seconds		
60 secs after aeration		

Color concentration in soaking water

spectrometer Readings

Soak water treatment	Transmission	Absorption
None		
Aerated (10cc)		
Acidified (10cc with 1cc N HCl)		

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No 3 (sk time ^{5:0} mis - hrs - days)

Weight of seeds (grams) per sample

	Dry	Wet	Dried
Petri dish + seeds	37.670		
Petri dish	27.670		
Seeds	10.000		

Soaking treatment

	Date	Time	Code No	Minutes
Into water				
Out of water				
Soaking time				

Drying time and seed weight

	Date	Time	Code No	Minutes	Dry wt seed
Into drier					
Dried weight 1					
2					
3					

Equilibrium

Final dry weight of seeds

Aeration (10 cc liquid)	Foam readings cc	Description
Aeration 15 seconds		
" 30 seconds		
60 secs after aeration		

Color concentration in soaking water

Spectrometer Readings

Soak water treatment	Transmission	Absorption
None		
Aerated (10 cc)		
Acidified (10 cc with 1 cc N HCl)		

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No 4 (sk time ^{10.0} min - hrs - days)

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

10.000

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dish + seed
Wt

Into drier

Dried weight

1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No 5 (sk time ^{20.0} mis - hrs - days

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date Time Code No Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date Time Code No Minutes ^{Dry + seed} Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No 6 (Sk time ³⁰ min - hrs - days)

Weight of seeds (grams) per sample

	Dry	Wet	Dried
Petri dish + seeds	41.705	45.600	
Petri dish	31.705		
Seeds	10.000		

Soaking treatment

	Date	Time	Code No	Minutes
Into water	Feb 1	2:35P		
Out of water	"	3:05P		
Soaking time				30

Drying time and seed weight

	Date	Time	Code No	Minutes	Wet seed Wt
Into drier	Feb 1	3:20P			
Dried weight 1	Feb 2	10:25 A			41.380
2	"	12:00 noon			41.130
3					

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)	Foam readings cc	Description
Aeration 15 seconds	33	
" 30 seconds	33	
60 secs after aeration	—	35% 5 & L bubbles
		10% " & shaking

Color concentration in soaking water

Spectrometer Readings

Soak water treatment	Transmission	Absorption
None	69.90	.159
Aerated (10cc)	73.00	.142
Acidified (10cc with 1cc N HCl)	38.00	.422

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and
solution of materials from the seeds

Soaking treatment

Sample No 1 (Sk time) ~~60~~ min - hrs - days

Weight of seeds (grams) per sample

	Dry	Wet	Dried
Petri dish + seeds	49.320	54.360	
Petri dish	39.320	39.320	39.320
Seeds	10.000		

Soaking treatment

	Date	Time	Code No	Minutes
Into water	Febr 1	1:25 P		
Out of water	"	2:25 P		
Soaking time				60

Drying time and seed weight

	Date	Time	Code No	Minutes	Dry + seed wt
Into drier	Febr 1	2:35 P			
Dried weight 1	Febr 2	10:10 A			48.82
2	" "	12:00 noon			48.61
3					

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)	Foam readings cc	Description
Aeration 15 seconds	<u>40</u>	
" 30 seconds	<u>40</u>	
60 secs after aeration	<u>—</u>	66% L & S bubbles
		" " " also shaking

Color concentration in soaking water

spectrometer Readings

Soak water treatment	Transmission	Absorption
None	<u>46.20</u>	<u>.335</u>
Aerated (10cc)	<u>51.70</u>	<u>.290</u>
Acidified (10cc with 1cc N HCl)	<u>13.9</u>	<u>.865</u>

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from the seeds

Soaking treatment

Sample No B (sk time - mis 210 hrs - days)

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date Time Code No Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date Time Code No Minutes

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (5k) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No. 9 (5k time - mis 3.0 hrs - days)

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dish + seed

Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No. 10 (sk time - mis 4.0 hrs - days)

Weight of seeds (grams) per sample

Dry

Wet

Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dish + seed
Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and
solution of materials from The seeds

Soaking treatment

Sample No. 11 (sk time - mis 5.0 hrs - days)

Weight of seeds (grams) per sample

Dry

Wet

Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dish +
seed

Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) A '78 Absorption of water and solution of materials from the seeds

Soaking treatment

Sample No. (12) (sk time - mis 5 hrs days)

Weight of seeds (grams) per sample

	Dry	Wet	Dried
Petri dish + seeds	41.84	48.75	
Petri dish	31.84	31.84	
Seeds	10.00	16.91	

Soaking treatment

	Date	Time	Code No	Minutes etc
Into water	Febr 2	7:45		
Out of water	"	1:45		
Soaking time				5 hrs

Drying time and seed weight

	Date	Time	Code No	Minutes	Dish + seed wt
Into drier	Febr 2	4:45 PM			48.75
Dried weight 1	Febr 2	3:45 PM			42.95
2	" 3	3:45 PM	No fan		40.65
3	" 6	10:00 AM			40.77
Equilibrium					40.77

Final dry weight of seeds

Aeration (10cc liquid)	Foam readings cc	Description
Aeration 15 seconds	70	
" 30 seconds	100 +	Flocced over top of graduated
60 secs after aeration	20 → 30	with foam clinging to side grad

Color concentration in soaking water

	Spectrometer Readings				Dilution rate
Soak water treatment	Transmission	Absorption			See units
None	10.25	5.40	0.900	.265	3
Aerated (10cc)	19.95	6.95	0.715	.155	3
Acidified (10cc with 1cc N HCl)	1.00	3.68	1.95	.435	6

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from the seeds

Soaking treatment

Sample No. (13) (sk time - mis 7.0 hrs days)

Weight of seeds (grams) per sample

	Dry	Wet	Dried
Petri dish + seeds	47.82	54.73	
Petri dish	37.82	37.82	
Seeds	10.00	16.91	

Soaking treatment

	Date	Time	Code No	Minutes etc
Into water	Febr 2	7:45A		
Out of water	"	2:45P		
Soaking time				7 hours

Drying time and seed weight

	Date	Time	Code No	Minutes	dry wt seed
Into drier	Febr 2	2:48P			54.73
Dried weight 1	" 2	3:45P			51.62
2	" 3	3:45P	No fan		46.58
3	" 6	10:00AM			46.69
Equilibrium					(46.69)

Final dry weight of seeds

Aeration (10cc liquid)	Foam readings cc	Description
Aeration 15 seconds	70	
" 30 seconds	125	Top of graduate
60 secs after aeration	40	50 with clinging on side walls

Color concentration in soaking water

Spectrometer Readings

Soak water treatment	Transmission	Absorption	
None	59.5	.223	3
Aerated (10cc)	66.5	.177	3
Acidified (10cc with 1cc N HCl)	37.5	.425	6

2/2/78
Hermay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and

solution of materials from The seeds

Soaking treatment

Sample No. 14 (sk time - mis 8.0 hrs days)

Weight of seeds (grams) per sample

Dry

Wet

Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dish +
seed
Wt

Into drier

Dried weight

1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No 15 (sk time mis 160 hrs days)

Weight of seeds (grams) per sample

Dry

Wet

Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dry + seed Wt

Into drier

Dried weight

1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (5k) '78 Absorption of water and

solution of materials from The seeds

Soaking treatment

Sample No. (16) (5k time mis - hrs / days)

Weight of seeds (grams) per sample

	Dry	Wet	Dried
Petri dish + seeds	41.41	48.36	
Petri dish	31.41	31.41	
Seeds	10.00	16.95	

Soaking treatment

	Date	Time	Code No	Minutes etc
Into water	Febr 2	7:45A		
Out of water	" 3	7:45A		
Soaking time				→ 1 day

Drying time and seed weight

	Date	Time	Code No	Minutes	Wt
Into drier	Febr 3	8:00A			48.36
Dried weight 1	" "	11:05A			41.33
2	" "	3:45P			39.95
3	" 6	10:00A			40.02

Equilibrium

Final dry weight of seeds

→ (40.02)

Aeration (10cc liquid)	Foam readings cc	Description
Aeration 15 seconds	75	
" 30 seconds	135	
60 secs after aeration	30	large bubbles

Color concentration in soaking water

spectrometer Readings

Soak water treatment	Transmission	Absorption
None	51.5	.285
Aerated (10cc)	—	—
Acidified (10cc with 1cc N HCl)	60.0	.772

Dilution
Vol H₂O
to 50cc

40cc

100cc

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (5k) '78 Absorption of water and

solution of materials from the seeds

Soaking treatment

Sample No 17 (5k time mis - hrs 2 days)

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date Time Code No Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date Time Code No Minutes Dried seed Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hermoy

Bitterbrush Seed

Experiment Soak (5k) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No 18 (5k time mis - hrs 3 days)

Weight of seeds (grams) per sample

Dry

Wet

Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Wt
dish + seed

Into drier

Dried weight

1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from the seeds

Soaking treatment

Sample No. 19 (sk time mis - hrs 4.0 days)

Weight of seeds (grams) per sample

Dry

Wet

Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dish + seed
Wt.

Into drier

Dried weight

1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 sec's after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No 20 (sk time-mis - hrs 5 days)

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date Time Code No Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date Time Code No Minutes

Dry + seed wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid) Foam readings cc Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment Transmission Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from The seeds

Soaking treatment

Sample No. 21 (Sk time mis hrs ⁶ days)

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date Time Code No Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date Time Code No Minutes ^{Dry + seed} Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid) Foam readings cc Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

spectrometer Readings

Soak water treatment Transmission Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (5k) '78 Absorption of water and solution of materials from the seeds

Soaking treatment

Sample No. 22 (5k time mis - hrs 7 days)

Weight of seeds (grams) per sample

Dry

Wet

Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dish + seed
Wt

Into drier

Dried weight

1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hermay

Bitterbrush Seed

Experiment Soak (sk) '78 Absorption of water and solution of materials from the seeds

Soaking treatment

Sample No 23 (sk time - mis - hrs & days)

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date Time Code No Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date Time Code No Minutes Dried seed Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid) Foam readings cc Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment Transmission Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (5k) '78 Absorption of water and

solution of materials from the seeds

Soaking treatment

Sample No. 24 (5k time mis - hrs 9 days)

Weight of seeds (grams) per sample

Dry

Wet

Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date

Time

Code No

Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date

Time

Code No

Minutes

Dry +
seed
Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

60 secs after aeration

Color concentration in soaking water

Spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

2/2/78
Hormay

Bitterbrush Seed

Experiment Soak (5k) '78 Absorption of water and
solution of materials from the seeds

Soaking treatment

Sample No. 25 (5k time-mis - hrs 10 days)

Weight of seeds (grams) per sample

Dry Wet Dried

Petri dish + seeds

Petri dish

Seeds

Soaking treatment

Date Time Code No Minutes

Into water

Out of water

Soaking time

Drying time and seed weight

Date Time Code No Minutes

Dry
seed
Wt

Into drier

Dried weight 1

2

3

Equilibrium

Final dry weight of seeds

Aeration (10cc liquid)

Foam readings cc

Description

Aeration 15 seconds

" 30 seconds

10 secs after aeration

Color concentration in soaking water

spectrometer Readings

Soak water treatment

Transmission

Absorption

None

Aerated (10cc)

Acidified (10cc

with 1cc N HCl)

Weight of drying seed

Dish

February 2 3:45 PM

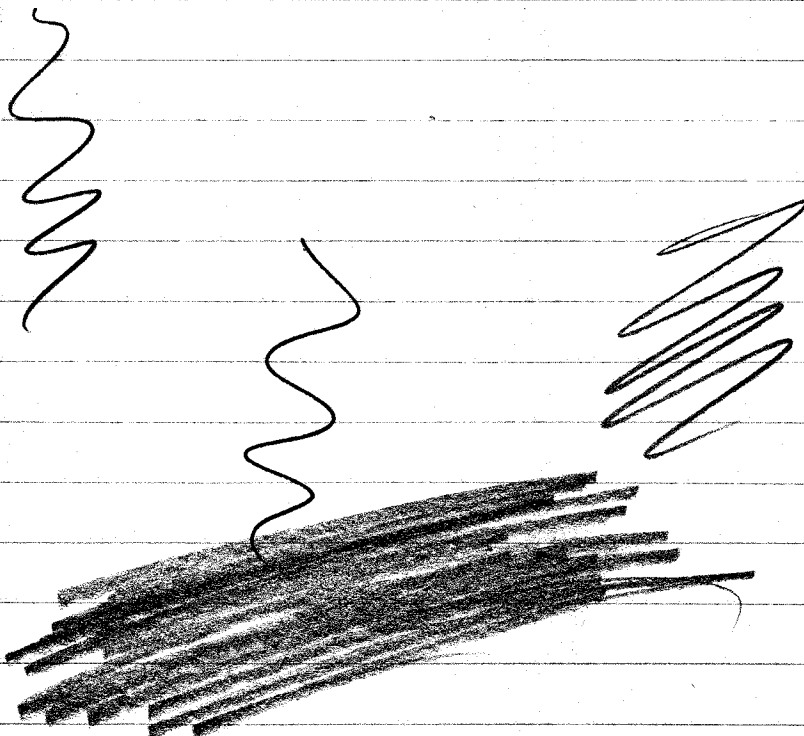
2/3 8AM

⑪ =	⑫	6hrs	40.99	42.95	31.840
	⑬	7hrs	48.22	51.62	37.820
	⑭	30 minutes	41.03	40.99	31.705
	⑮	1hr	48.57	48.52	39.320

50.900

40.140

10.760



Bitterbrush Seed

Experiment H₂O Soak A-78

Continuous same H₂O

Soaking Schedule

Sample Distrs	No weighed	Soaking time	Sample No	Soaking time
1	✓	1.25 minutes		
2	✓	2.50 "		
3	✓	5.00 "		
4		10.00 "		
5		20.00 "		
6	✓	30.00 "		
7	✓	60.00 "(1hr)		
8		120.00 → 2 hrs		
9		3 "		
10		4 "		
11		5 "		
12		6 "		
13		7 "		
14		8 "		
15		16 "		
16		1440.00 → 24 (1 day)		
17		2 days		
18		3		
19		4		
20		5		
21		6		
22		7		
23		8		
24		9		
25		10		

Exp H₂O Soak A-78

Weight dry seed per sample	10.000 grams
Volume of water used in soaking seeds	45 cc
" " " " in aeration	10 cc
" " " " in acidified sample (1 cc N HCl used in acidification)	10 cc

Experiment Scale (Sk) A 78

Color Concentration

High concentrations of soaking liquid diluted by 5cc units of distilled water to 5cc of soaking liquid

Dilution Rate

Volume of soaking liquid	Volume of H ₂ O added	Dilution Rate
5cc	0	0
"	5	1
"	10	2
"	15	3
"	20	4
"	25	5
"	30	6
"	35	7
"	40	8

Container labelling

Test tube with dry seed

Exp. Soak A-78 (Soak = Sk)

Sample and soaking time (1) 5 min

→ Petri dishes

Sk A-78

① 5 min.

Wt _____

Test tube with soak water

Sk A-78

(1) 5 min

Test tube with germination sample (10cc)

Sk A-78

① A 5 min

Test tube with acidified solution (15cc)

Sk A-78

① B 5 min

HCl

Bitterbrush Seed

Exp. H₂O Soak - A-78 Continuous soaking in
The same water

After soaking seed for the appropriate
period. - (50 ml capacity t.t.). Soak in
45 cc of distilled H₂O

Seed
wt
gain -
loss

1. Pour off water ^(solution) into 50 ml capacity
screw cap test tube
2. "Dry" seed on paper towels
3. Pour "dried" seed into appropriately
marked (and weighed) Petri dish
4. Weigh dish with seed = weight wet
seed
5. Place ~~seed~~ dish with seed into fan box
drier and dry to minimum weight

Aeration

(from 1 above)

Solution
gelatin-
ous material
and
real pigment

1. Pour 10 cc of solution into 100 ml
capacity graduate and aerate
Measure foam height 15, 30 seconds
and after aeration stopped 1 minute
2. Pour 10 cc of solution into screw cap
test-tube and acidify with 1 cc of
normal HCl
3. Retain remainder of solution in t.t
4. Test pigment concentration in 2 and
3. above

Arbitrary
Time

Cumulative

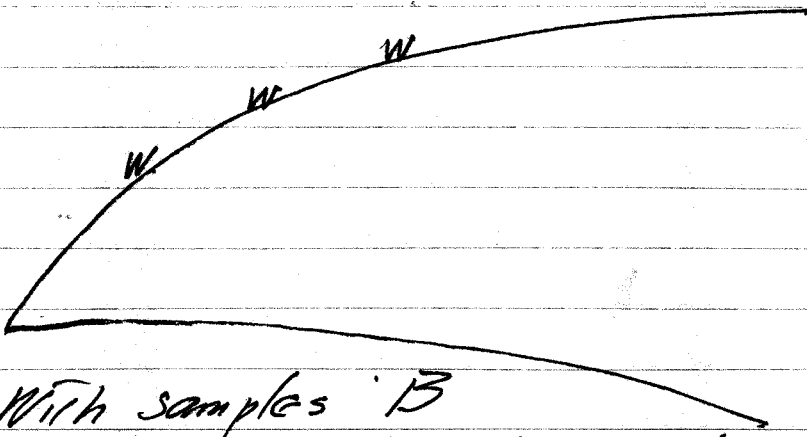
Diff
mins

Samples
A

Samples
B

1:00	0	5	
1:05	5	10	1 out and weigh
1:15	15	15	2
1:30	30	30	3
2:00	1hr	60	4
3:00	2	60	5
4:00	3	60	6
5:00	4	60	7
6:00	5	60	8
7:00	6	60	9
8:00	7		
9:00	8		

With samples A soaking continuous in same water for periods shown in column headed Cumulative



With samples B

Take sample at same time as in A and process as in A

But draw off water in all remaining samples store in t.t.s and refilled remaining samples

with steam water.

Compilation
Febr 13 1978

Hormay

Bitlerbrush Seed

Exp Seak (Sk) A-78 Febr 1-13 1978 Lab 7

Leach coloring materials

Sample	Seaking time	Non-acid		Acidified		Final Abs	Final Abs
		Trans - mitance Value	Dilu- tion factor	Trans - mitance Value	Dilu- tion factor		
1	1.75 min	84.20	-	84.20	15.8	84.50	15.5
2	250 "	85.50	-	85.50	14.5	86.00	14.0
3	5.00 "	83.20	-	83.20	16.8	82.50	17.5
4	10.00 "	80.00	-	80.00	20.0	70.50	29.5
5	20.00 "	81.50	-	81.50	18.5	60.20	39.8
6	30.00 "	69.90	-	69.90	30.1	38.00	62.0
7	1 hr	46.20	-	46.20	53.8	13.90	96.1
8	2 "	39.50	-	39.50	60.5	60.30	89.9
9	3	63.50	23	21.17	78.8	40.00	92.0
10	4	59.00	23	19.67	80.3	50.00	92.9
11	5	31.00	12	15.50	84.5	53.50	94.1
12	6	54.00	34	13.50	86.5	36.80	94.7
13	7	59.50	34	14.90	85.1	37.50	94.6
14	8						
15	16 "						
16	1 day	51.5	89	5.72	94.3	60.00	97.1
17	2 "	48.5	56	8.10	91.9	37.00	96.3
18	3						
19	4						
20	5	49.0	56	8.20	91.8	57.50	96.4
21	6						
22	7						
23	8						
24	9						
25	10 "						

Bitterbrush Seed

Compilation
Febr. 13 1978

Exp. Soak (Sk) A-78 Febr 1-13 1978 Lab 7 Hormay

Absorption of H ₂ O with soaking (70-75°F)								
Sample	Soaking time	← Weight		Weight		→		
		Dish + dry seed grams	Dish + seed after soaking grams	Dish grams	Wet seed grams	Increase with soaking		
0	0	All samples				→ 10.00 (dry seed)		
1	1.25 minutes	50.140	50.900	40.140	10.76	0.76	7.6	
2	2.50 "		43.370	32.660	10.71	0.71	7.1	
3	5.00 "		39.040	27.670	11.37	1.37	13.7	
4	10.00 "		44.150	32.165	11.99	1.99	19.9	
5	20.00 "		48.320	35.470	12.85	2.85	28.5	
6	30.00 "		45.600	31.705	13.90	3.90	39.0	
7	60.00 (1hr)		54.360	39.320	15.04	5.04	50.4	
8	2 hours		46.245	30.040	16.21	6.21	62.1	
9	3		44.620	27.845	16.78	6.78	67.8	
10	4		42.470	25.720	16.70	6.70	67.0	
11	5		53.840	36.900	16.94	6.94	69.4	
12	6		48.750	31.840	16.91	6.91	69.1	
13	7		54.730	37.820	16.91	6.91	69.1	
14	8							
15	16							
16	24 (1 day)		48.360	31.410	16.95			
17	2 days		45.060	28.375	16.69			
18	3							
19	4							
20	5		47.710	31.410	16.30			
21	6							
22	7							
23	8							
24	9							
25	10							

Bitterbrush Seed
Exp Soak (Sk) A-78 Febr 1-13 1978 Lab 7

Compilation
Febr 13 1978
Hormay

Decrease in dry weight with solution of materials from seed with soaking (70-75°F)						
Sample	Soaking time	Weight				
		Dry seed + dish	Dried seed after soaking + dish	Dish	Dried seed	Decrease of seed with soaking grams
			grams	grams	grams	
1	1.25 min		49.70	40.14	9.56	
2	2.50 "		42.01	32.66	9.35	
3	5.00 "		37.09	27.67	9.42	
4	10.00 "		41.58	32.17	9.41	
5	20.00 "		44.85	35.47	9.38	
6	30.00 "		41.03	31.71	9.32	
7	1 hr		48.57	39.32	9.25	
8	2 "		39.15	30.04	9.11	
9	3		36.86	27.85	9.01	
10	4		34.70	25.72	8.98	
11	5		45.84	36.90	8.94	
12	6		40.77	31.84	8.93	
13	7		46.69	37.82	8.87	
14	8				8.85	
15	15				8.73	0.75
16	1 day		40.02	31.41	8.61	
17	2		36.74	28.38	8.36	
18	3				8.29	
19	4				8.22	
20	5		39.56	31.41	8.15	
21	6					
22	7					
23	8					
24	9					
25	10					

0.153/hr

0.07/day

Hormay

SK A-78 (5P) Soak and resoak

Date Time Seeds soaked 6 days 19 1/2 hrs (large tt)
In 2/3 4:15 P out 7/9 11:43 A

Febr

9 11:43 A Soaking solution drawn off seed —
²⁹39.50 cc. Initial soak. Solution
stored in tt -A-

Seed resoaked in clear water for 2 hour
periods as follows

Resoak #1

9 12:45 P Seed into soak in ²⁹~~39~~.50 cc ^{clear} H₂O
2:45 P " out " after 2hrs soaking
Solution into tt -B-

Resoak #2

2:48 P Seed into soak in ²⁹~~39~~.50 cc ^{clear} H₂O
4:48 P Seed out soak after 2hrs soaking
Solution into tt -C-

Resoak #3

4:50 P Seed into soak ²⁹~~39~~.50 cc ^{clear} H₂O
6:00 PM " out soak
Solution into tt -D-

Resoak #4

6:00 PM Seed into soak as above

Febr 10 out 8:00 AM " out soak -E-

Resort #5

Feb 10 8:00 AM Into sealc
12:00 noon, Out sealc -F-

~~Resort #6~~

" ~~12:00 noon Into sealc~~
~~4 PM Out sealc -G-~~

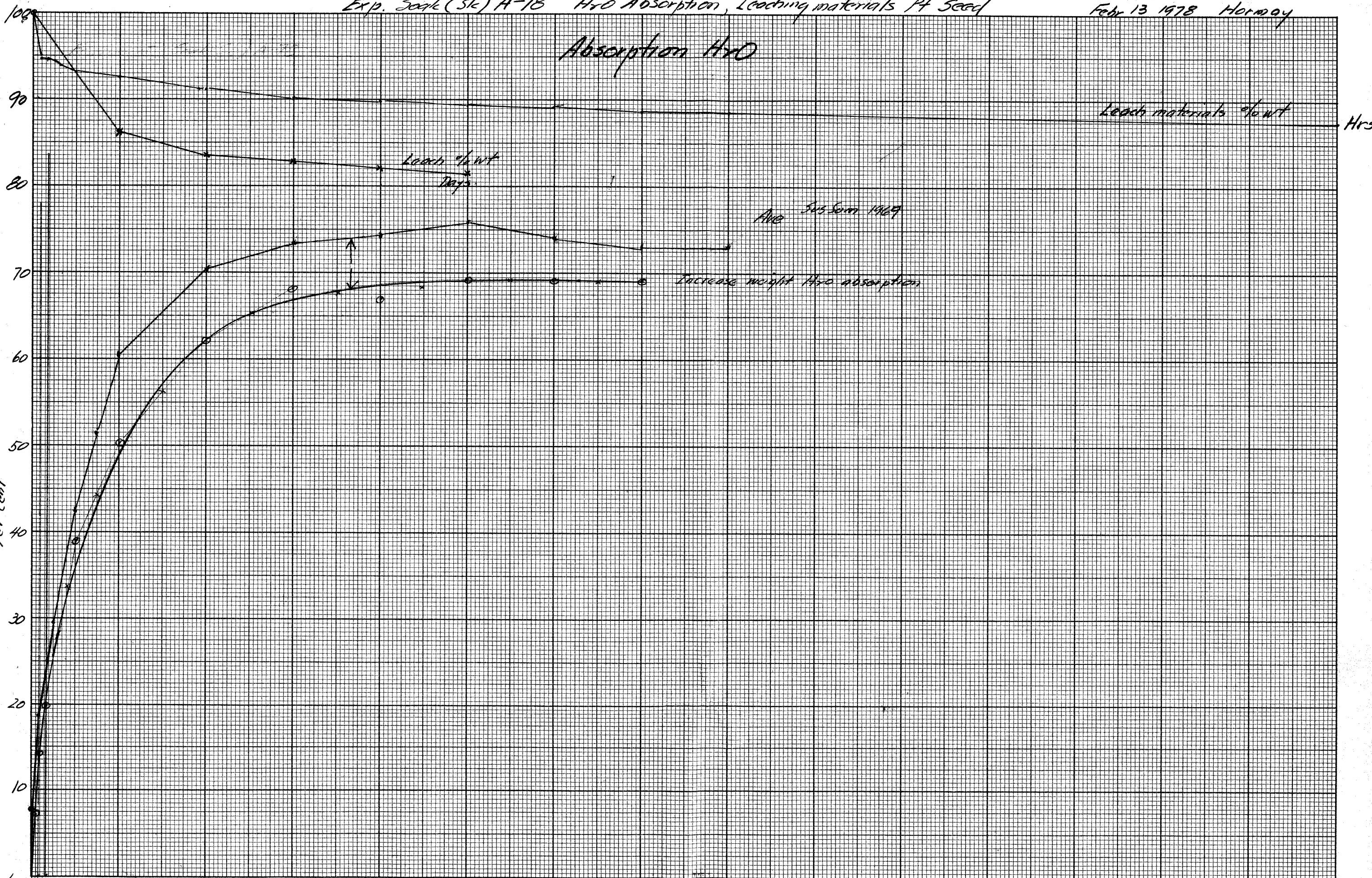
Resort #6

Feb 10 4 PM Into sealc
Feb 13 8 AM Out sealc

Absorption H₂O

K&E 20 X 20 TO THE INCH 47 1240
MADE IN U.S.A.
KEUFFEL & ESSER CO. Per cent

Minutes 5 15 30 60 120 3 4 5 6 7 8 9 10 11 12 13 14 15
Hours (or days) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15



Jan 6 1978
Hormay

Absorption of water by bitterbrush seed (and retention of materials from the seed)

Summary of 5 tests

Test No		1	2	3	4	5	Total	N	Ave
" Designation		Bitter mill A	Timber Mill B	Exp L	Exp L	Exp L			
Date of test		Mar 7 1961	Mar 7 1961	Jan 8 1970	Jan 9 1970	Jan 10 1970			
Seed used		GB 190	GB 195	305 S.M. 1969	GB 159	505 1945			
Date seed collected		1952+	1952+	1969	1952+	-1945-			
Weight of seed used (grams)		10.00	10.00	17.7	46.9	20.1	Time		
Soaking time (Minutes)	Factor	0.1	0.1	563	2132	1465			
	(Hours)			Percent Increase in Weight ²			34.85		34.85
0		0	0	0	0	0	0		
0.83 (5 seconds; dipped)				5.7	5	8.8	5 sec 14.5	2	7.3
1		<u>Total</u>	<u>Ave</u>	11.9	30		1 min 14.9	2	7.5
5		7.0 15.0	8.0 7.5	15.8	21.9	17.3	5" 155.0	3	18.3
15	0.75	22.0 40.0	20.0 20.0	26.0	29.0	33.5	15" 88.5	3	29.5
30	0.50	32.2 80.7	42.5 40.4	37.9	43.0	46.4	30" 127.3	3	42.4
45	0.75	48.5 96.0	47.5 48.0	41.8	56.5	56.0	45" 154.3	3	51.4
60	1.00	58.2 111.2	53.0 55.6	54.2	59.0	68.0	60 (1 hr) 181.2	3	60.4
120	2 -	72.2 144.0	72.0 72.0	67.8	71.0	71.5	2 hrs 210.3	3	70.1
180	3 -	81.2 168.2	87.0 84.1	72.3	76.0	72.0	3 - 220.3	3	73.4
240	4 -	83.0 170.0	87.0 85.0	72.9	77.0	72.0	4 - 221.9	3	74.0
300	5 -	83.0 168.5	85.5 84.3	74.6	77.0	72.0	5 - 151.6	2	75.8
360	6 -	83.5 170.4	84.9 85.2	74.0		72.0	6 - 74.0	1	74.0
420	7 -	86.0 168.5	82.5 84.3	72.9		72.0	7 - 72.9	1	72.9
480	8 -	86.0 172.0	86.0 86.0	72.9		71.5	8 - 72.9	1	72.9
540	9 -	82.2 166.2	84.0 83.1						
600	10 -	82.2 167.4	85.2 83.7		76.7				
11		↑							
12									
13		81.2 165.1	83.9 82.6						
14									
15									
16		80.2 162.8	82.6 81.4						
17									
18									
19		79.2 160.5	81.3 80.3						
20									
21		71.3			75.9		75.9	1	75.9
22 - 27 minutes		78.2 158.2	8.00 79.1		16.5				
73				72.9	7.4	71.5	71.5	1	71.5
							72.9	1	72.9
Days									
1 24 hrs		77.2 156.4	7.92 78.2						
2		74.2 149.4	7.52 74.7						
3		75.2 150.4	7.52 75.2						
4		72.2 147.4	7.52 73.7						
6		73.2 146.4	7.32 73.2						
8		72.2 146.4	7.42 73.2						
9		72.2 146.4	7.42 73.2						
13		72.2 146.4	7.42 73.2						

¹ Figures in blue ink interpolations between measured values shown in pencil

² Factor for calculating percent moisture increase = $\frac{1}{\text{wt dry seed}}$ = multiplier
Percent moisture increase = $\frac{\text{wt wet seed} - \text{wt dry seed}}{\text{wt dry seed}}$ = Wet seed X multiplier factor