

October 9, 1992

RESEARCH REPORT: PINELANDIA BIOPHYSICAL LABORATORY

LABORATORY CODE: KS-01-42 & 44

PLANT MATERIAL: *Avena sativa*, *Hordeum vulgare* and *Triticum aestivum*
(oats, barley and wheat)

FORMATION: All formation samples from the U.K., two from Berry Pomeroy, one from Guzzledown, Brixham, and one from the Aller farm, Dawlish.

COLLECTED BY: Various individuals - submitted by Pat Delgado

COMMENTS ON SAMPLES: All plant material was sufficiently dried down before mailing to the lab. Actually three sample sets were submitted from the Berry Pomeroy formations. The final set was taken in late development and the collector did not bother to take controls since he had submitted controls in an earlier collection. This is a drastic error - the final set of samples could not be used in a germination comparison since the earlier controls were harvested at a different development stage.
Controls must be taken at each sample collection.

LABORATORY STUDIES:

Sample 1 = Berry Pomeroy. Oat formation taken 7-23-92 from a double circle complex (KS-01-44).

I.) Seed head comparisons - no difference observed between the control and circle sample groups.

II.) Cell Wall Pit Examination - the cell wall pits were readily observed in the bract tissue and the size data are summarized below N=30 per samp.

<u>Sample</u>	<u>Average Pit Dia.-Micron</u>		<u>Change</u>
Control	1.74	0.26 s.d.	-----
Circle	2.14	0.46 s.d.	+23.0%*

*-P<0.05

It should be noted here that, as in numerous other samples examined, not only are the pit diameters significantly larger in the circle sample, but the variance is also much greater than in the controls.

III.) Seed Germination - paper roll germination as in previous studies. The following data are for 20 day seedling growth using 20 seeds per test series.

<u>Sample</u>	<u>Seedling Length-cm</u>	<u>Germination</u>
Control	7.06 s.d. 4.90	35%
Circle	13.14 s.d. 4.87	70%

This germination and growth stimulation in the circle samples is typical of the results from seeds taken in formations relatively late in the growing season.

Sample 2 - Berry Pomeroy. Barley formation on 6-11-92, taken 7-9-92 no information on geometry of formation.

I.) External Appearance - normal head development in both sample groups - seeds from circle were slightly darker in color than controls.

II.) Cell Wall Pit Examination- bract tissue examined in the usual manner N=30 per sample (dia in microns).

<u>Sample</u>	<u>Ave. pit Diameter</u>	<u>Change</u>
Control	2.09 s.d. 0.33	-----
Circle	2.57 s.d. 0.70	+23.0%*

*-P<0.05

III.) Seed Germination - Both seed sets had very poor germination - at 10 days in the growth chamber, 45% of the controls had germinated and only 5% of the circle sample. It appears that the circle samples had a lower vigor than the controls and this can be accounted for by the fact that the formation occurred at an early growth stage and drastically reduced seed vigor. It should be noted that the Sample-1, Berry Pomeroy set was taken over a month later. Increased seed vigor has been consistently observed in seeds taken at the later growth stages.

Sample 3 = Guzzledown, Brixham, - taken 6-12-92, the wheat and barley samples were limited to only one or two plants and this reduced the amount of tests which could be conducted.

I.) Seed Examination - seeds from both the control and circle wheat heads disclosed incomplete endosperm development. In the barley plants all the circle seeds were underdeveloped whereas the controls were of normal appearance.

II.) Cell Wall Pit Diameters - data compiled from bract tissue N=30 per sample (dia. in microns).

<u>Sample</u>	<u>Ave. Pit Diameter</u>	<u>Change</u>
Wheat Control	2.15 s.d. 0.58	-----
Wheat Circle	2.17 s.d. 0.51	+0.9% (N.S.)
Barley Control	2.48 s.d. 0.36	-----
Barley Circle	2.30 s.d. 0.33	-7.3% (N.S.)

No significant changes were noted in the cell wall pit diameters.

III.) Seed Germination - only the wheat contained sufficient seeds for germination. At 10 days both the control and circle plants were at 100% and there was no significant difference in the plant growth.

Sample 4 - Aller Farm, Dawlish, barley plants, with no information on the dates of sampling or the type of formation.

I.) External Appearance - the heads and seeds appeared to be normally developed - seeds from the circle plants were slightly darker in color than the controls.

II.) Cell Wall Pit Examination - bract tissue examined N=30 per sample.

<u>Sample</u>	<u>Ave. Pit Dia.-micron</u>	<u>Change</u>
Control	2.22 s.d. 0.34	-----
Circle	2.66 s.d. 0.64	+19.8%*

*-P<0.05

III.) Seed Germination - at 10 days no significant difference in the germination or seedling growth.

SUMMARY: In these various sample sets the influence of the development stage on the response of the plants to the external forces, is quite apparent. It is unfortunate that more information was not obtained regarding the dates of formation and the overall geometry.



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