to hydrolyze the polysaccharide to glucose. The glucose was then measured as a reducing sugar. The results of different dosage levels of ae with homozygous su_1 are given below:

Genotype	Phytoglycogen in mg/g dry wt. ± std. dev.	Absorbancy Maxima (mu)	β-amylolysis limit (%)
+ + + su_1 su_1 su_1	387.6 ± 7.3	475	40.9
+ + ae su_1 su_1 su_1	343.4 ± 7.1	475	40.2
+ ae ae su_1 su_1 su_1	232.9 ± 13.6	475	41.9
ae ae ae su_1 su_1 su_1	42.0 ± 8.0	475	45.7

Only the endosperms homozygous for su_1 contained phytoglycogen. Increasing doses of ae decreased the amounts of phytoglycogen. The double mutant (ae ae ae su_1 su_1 su_1) contained phytoglycogen in contrast to an earlier report from this laboratory (Black et al. 1966, Genetics 53:661-668); however, they were using a different and more heterogeneous genetic background.

Absorbancy maxima in an iodine-potassium iodide and saturated calcium chloride solution indicated the phytoglycogens from each of the genotypes were identical. However, the β-amylolysis limit of the double mutant was higher than the others, suggesting that it may be a more loosely branched phytoglycogen.

Studies are in progress to analyze the starches from these genotypes with regard to the ratio of amylose and amylopectin and the structure of the amylopectin. Studies are planned to survey the genotypes for branching and debranching enzymes.

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2. Phenotypic dosage effects exhibited by Ae in combination with wx.

It has been observed in this laboratory that Ae exhibits a dosage effect which reflects the genotype of the endosperm. Ae Ae Ae wx wx wx and Ae Ae ae wx wx wx endosperms are full and waxy in phenotype, the two genotypes being indistinguishable. However, Ae ae ae wx wx wx endosperms are tarnished waxy and appear to be smaller in size. The phenotype of

Table 1

Endosperm classes of F_2 families segregating for ae, ae^{B1}, ae^{B3} and ae^{il}, respectively, with homozygous wx

Family no.	Ae alleles in heterozygote[a] (all wx wx)	Total no. kernels	Endosperm classification (all wx wx wx) 1. Ae Ae Ae / Ae Ae ae (waxy)	2. Ae ae ae (tarnished, waxy)	3. ae ae ae (glassy, wrinkled)	χ^2 (2:1:1)	Probability %	χ^2 (1:1)[b]	Probability %
1	Ae ae	334	176	84	74	1.57	45.7	1.21	28.5
2	Ae ae^{B1}	376	195	88	93	.65	72.1	.53	47.8
3	Ae ae^{B3}	304	157	76	71	.49	78.2	.33	57.4
4	"	284	142	62	80	2.28	32.0	.004	95.5
5	"	338	153	90	95	3.18	20.5	3.04	10.4
6	"	396	208	99	89	1.52	46.9	1.02	32.7
7	Ae ae^{il}	304	157	76	71	.49	78.2	.33	57.4
8	"	383	194	93	96	.11	94.5	.07	79.9
9	"	363	187	102	74	4.65	9.9	.34	57.2
10	"	388	183	112	93	3.11	21.3	1.25	27.7
11	"	363	172	105	86	2.98	22.6	1.00	33.0
12	"	254	120	82	52	7.86	2.2	.78	38.9
13	"	158	75	46	37	1.43	48.9	.41	53.2
14	"	453	226	88	139	11.49	.6	.004	94.9
15	"	528	300	108	120	10.36	.8	9.84	3.0
16	"	356	167	99	90	1.81	40.5	1.37	25.8
17	"	307	142	93	72	4.60	10.3	1.73	20.5
18	"	179	89	49	41	.72	69.8	.01	91.8
19	"	310	156	86	68	2.10	35.0	.02	90.2
20	"	287	136	81	70	1.63	44.4	.79	38.5
21	"	277	142	71	64	.53	76.7	.18	67.8
22	"	300	138	87	75	2.88	23.8	1.93	18.3
23	"	239	123	61	55	.51	77.7	.21	65.5
24	"	402	194	113	95	2.10	35.1	.49	49.2
25	"	51	22	16	13	1.31	51.9	1.00	33.0
26	"	96	51	23	22	.40	82.1	.39	54.4

Table 1 (Continued)

Family no.	Ae alleles in heterozygote[a] (all wx wx wx)	Total no. kernels	Endosperm classification (all wx wx wx): 1. Ae Ae Ae / Ae Ae ae (waxy)	2. Ae ae ae (tarnished, waxy)	3. ae ae ae (glassy, wrinkled)	df	χ^2 (2:1:1)	Probability %	χ^2 (1:1)[b]	Probability %	df
27	Ae ae^{il}	292	151	75	66		.90	63.9	.35	56.6	
28	"	357	175	103	79		3.36	18.7	.14	71.5	
29	"	389	179	99	111		3.21	20.2	2.48	13.6	
30	"	248	105	88	55		14.60	.4	5.82	2.0	
31	"	282	130	80	72		2.17	33.9	1.72	20.0	
32	"	369	190	111	68		10.35	.8	.33	57.4	
33	"	176	91	39	46		.76	68.4	.20	65.5	
		10,143	5026	2685	2432						
Tests of heterogeneity:											
					Total	66	106.13		39.32	25.0	33
					Pooled	2	13.44	.5	.60	45.0	1
					Heterogeneity	64	92.69	1.5	38.72	20.0	32

[a] ae (amylose-extender); ae^{B1} (amylose-extender, Bear 1); ae^{B3} (amylose-extender, Bear 3); ae^{il} (amylose-extender, induced 1)

[b] Ratio of the value of class 1: value of class 2 + class 3

Table 2

Endosperm classes of testcross families segregating for ae^{B1} and ae^{B3}, respectively, with homozygous wx

Family no.	Ae alleles in heterozygote (all wx wx) ♀	Ae alleles in heterozygote (all wx wx) ♂	Total no. kernels	Endosperm classification: Ae Ae ae / wx wx wx	Endosperm classification: Ae ae ae / wx wx wx	Endosperm classification: ae ae ae / wx wx wx	χ^2 (1:1)	Probability %
1	Ae ae^{B3}	ae ae	419	202	---	217	.54	47.2
2[a]	Ae ae^{B1}	ae ae	255	121	---	134	.67	42.4
3[a]	ae ae	Ae ae^{B1}	362	---	220	142	16.86	< .1
4	ae ae	Ae ae^{B3}	211	---	125	86	7.25	3.2
5	"	"	202	---	112	90	2.41	14.0
6	"	"	279	---	176	103	19.17	< .1
7	"	"	198	---	125	73	13.73	.1
8	ae^{il} ae^{il}	"	347	---	207	140	16.86	< .1

[a]Reciprocal cross - same heterozygote used as female and male, respectively.

ae ae ae wx wx wx endosperms is glassy and wrinkled or partially shrunken.

The purpose of this report is to present the evidence for the dosage effect of Ae with 4 different alleles in a wx background and to present evidence for the lower transmission frequencies of amylose-extender alleles through the male gametophyte. The 4 alleles of Ae as designated by this laboratory group are ae (standard amylose-extender), ae^{B1} (amylose-extender, Bear 1), ae^{B3} (amylose-extender, Bear 3), and ae^{il} (amylose-extender, induced 1).

Kernels from 33 F_2 families that were segregating for Ae and homozygous wx were classified for the 3 phenotypic classes. Each family was tested by the χ^2 test for goodness of fit to a 2:1:1 ratio. A second χ^2 analysis (1:1) was performed by pooling classes 2 and 3. The results of these analyses are shown in Table 1.

All the observed phenotypic ratios fit the expected 2:1:1 ratio except those for 5 families (12, 14, 15, 30 and 32, respectively). However, when classes 2 and 3 were pooled and tested with class 1 for goodness of fit to a 1:1 ratio, only two of these families (15 and 30) failed to fit the expected ratio at the 5% level of significance. In general there appeared to be deficiencies in transmission of ae and ae^{il} through the pollen. These deficiencies are the probable causes for families 12, 30 and 32 not fitting the expected 2:1:1 ratio. However, families 14 and 15 appeared to have an excess of individuals homozygous for ae^{il}. The reason is not known but one possibility may be the gametophyte factor on chromosome 5 that is linked with ae.

The testcross data are shown in Table 2. Five of 8 families did not fit the expected 1:1 ratio, apparently because of deficiencies in transmission of ae^{B1} and ae^{B3} through the pollen. The results with families 1 and 2 indicate that ae^{B1} and ae^{B3} are transmitted in frequencies approximately equal to Ae in the female gametophyte. Families 2 and 3 are reciprocal crosses with the same parents. Family 3 has a lower frequency of ae^{B1} ae ae wx wx wx kernels than family 2, indicating a lower transmission of ae^{B1} than Ae through the pollen but not through the egg.

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