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1. The rate of alcohol dehydrogenase in vivo decay in endosperm of maize.

In studies relating to genetic control of enzyme activity, it is most important to know the rate of *in vivo* decay of the enzyme. In an earlier study (Efron and Schwartz, Proc. Natl. Acad. Sci. 61: 586-591, 1968) we have described a two factor system for the *in vivo* inactivation of maize alcohol dehydrogenase. In this study we have found that the ADH enzyme from embryo extracts is stable over prolonged periods of incubation at room temperature. However, we did not have information on the *in vivo* stability of the enzyme. In later studies (e.g. Efron, MNL 45: 25-27) we have described three inbred lines (AD-1, AD-7 and AD-19) having different activities of ADH. Until now we have not ruled out the possibility that the variation in ADH activity is due to differences in enzyme stability.

Endosperm from the developing kernel has been used in this study. We have followed ADH activity in the developing endosperm of the inbred lines AD-1, AD-7 and AD-19. Plants of the three lines were self pollinated in the field, harvested at different days after pollination and stored at -20°C. ADH activity was tested by following the rate of NAD reduction at 340 mμ. The results were calculated as ADH activity units/single kernel/ μg protein.

The three lines showed clear differences in their ADH activity in the endosperm (Table 1). AD-19 and AD-7 showed the highest and lowest activities, respectively. However, the relative change in activity with time was similar in all three lines. The relative activity (percent of the highest activity) was increased from eight to twenty-one days after pollination in about the same rate. From 21 days on, a slow decrease in activity was observed. ADH activity was not tested daily. Therefore, it is possible that higher activities could be found before or after 21 days. Nevertheless, these results suggest that ADH is synthesized in the endosperm during the first three weeks after pollination. It is assumed that the Adh_1 structural gene is "turned off" at this time and therefore the decrease in ADH activity may reflect its *in vivo* decay. Since it is

Table 1

ADH activity (Activity units/kernel/ug protein) in the developing endosperm of the inbred lines AD-1, AD-7 and AD-19.

Days after pollination	AD-7			AD-1			AD-19		
	Activity units	Relative rate of synthesis (%)	Relative rate of decay (%)	Activity units	Relative rate of synthesis (%)	Relative rate of decay (%)	Activity units	Relative rate of synthesis (%)	Relative rate of decay (%)
8	1.6	5.0		2.0	4.1		2.2	3.7	
10	5.0	15.6		8.4	17.4		10.2	17.2	
13	11.2	35.0		18.3	38.0		32.4	54.8	
17	28.4	88.7		40.5	84.0		53.7	90.8	
21	32.0	100.0		48.2	100.0		59.1	100.0	
26	30.1		100.0	44.0		100.0	54.0		100.0
30	26.2		87.0	37.2		84.5	48.2		89.2
35	20.6		68.4	32.3		73.4	44.3		82.0
40	15.8		52.4	26.1		59.3	36.1		66.8

possible that higher activities could be found between 21 and 26 days, the activities found at 26 days after pollination were used as a reference (100%) for the rate of decay.

The rate of the average daily decay was relatively very low (Table 2). The average decrease in activity units was similar in the three lines. But, since the levels of activity were different, the relative loss of activity was somewhat different too.

Table 2

Mean daily loss of ADH activity in the endosperm of AD-1, AD-7 and AD-19.

Days after pollination	Mean daily loss of ADH activity					
	Activity units			Percent of activity		
	AD-7	AD-1	AD-19	AD-7	AD-1	AD-19
26-30	.98	1.71	1.45	3.25	3.88	2.70
30-35	1.12	.98	.78	4.28	2.64	1.62
35-40	.96	1.24	1.64	4.68	3.96	3.72
26-40	1.02	1.28	1.28	3.40	2.90	2.40

Thus, it might be concluded that ADH is a stable enzyme unless it is actively inhibited (Efron and Schwartz, 1968), and that the differences in ADH activities of the three lines are not due to differences in enzyme stability.

Y. Efron

2. Extent of variation in ADH activity and Adh_1 genotypes among inbred lines of maize.

The subject of variation in enzyme activity and its genetic control is under investigation in our laboratory for the last few years. We have shown variation in acid phosphatase activity in maize (Efron, Biochem. Genet. 5: 33-44, 1971) and alcohol dehydrogenase activities in maize