

INFLUENCE OF af , st AND tl GENES ON NITRATE REDUCTASE ACTIVITY IN PEAS<sup>1/</sup>

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Lodging is one of the major problems in the cultivation of the pea crop and many authors have suggested new plant models in order to improve standing ability. Pea mutants with a modified leaf morphology due to the presence of the af, st, and tl genes have largely been studied for this purpose. Some of them, however, influence the yield components negatively (1, 4). The af gene reduces the seed production per plant by reducing the number of fertile nodes and pods, st by reducing pod fertility and seed weight, whereas tl increases pod set and number of seeds at the first fertile node.

Eight isogenic lines, provided by G. A. Marx, with all eight combinations of the three genes, were analyzed for nitrate reductase activity (NRA) of leaves, according to a procedure adapted from Salomonson (1). The sampling was performed at five stages during plant development, at full daylight.

Data in Table 1 show that NRA declined during plant development in all eight lines. A correlation between this enzyme and the final yield was found for several species (2) and our results seem to confirm this relationship.

When the eight lines were considered according to the presence/absence of each of the three genes (Fig. 1), plants recessive for tl had a higher NRA than the Tl plants, whereas the af\_ plants had a lower NRA than Af plants. No effect of st locus was found.

The strong influence of af and tl on morphology and productivity is well known; our results reveal that they also affect plant metabolic aspects. Other biochemical traits should be investigated in order to understand the basis for action of these major genes.

1. Gritton, E. T. 1972. PNL 4:11-12.
2. Mifflin, B. J. 1980. In The Biology of Crop Productivity. P. S. Carlson, ed.
3. Salomonson, L. P. 1975. Plant Physiol 56:853-855.
4. Snoad, B. 1981. Scient. Hort. 14:9-18.

Table 1. Nitrate Reductase Activity in eight pea near-isogenic lines ( $\mu$  moles of NADH oxydate  $\text{g FW}^{-1} \text{m}^{-1}$ ).

Genotype			Days after sowing				
<u>Af</u>	<u>St</u>	<u>Tl</u>	25	39	52	68	88
+	+	+	.140	.101	.087	.068	.069
af	+	+	.126	.116	.077	.068	.042
+	st	+	.135	.116	.087	.058	.071
+	+	tl	.164	.106	.068	.077	.091
af	st	+	.077	.092	.058	.048	.052
+	st	tl	.140	.097	.097	.097	.077
af	+	tl	.145	.106	.091	.068	.054
af	st	tl	.097	.097	.087	.058	.073

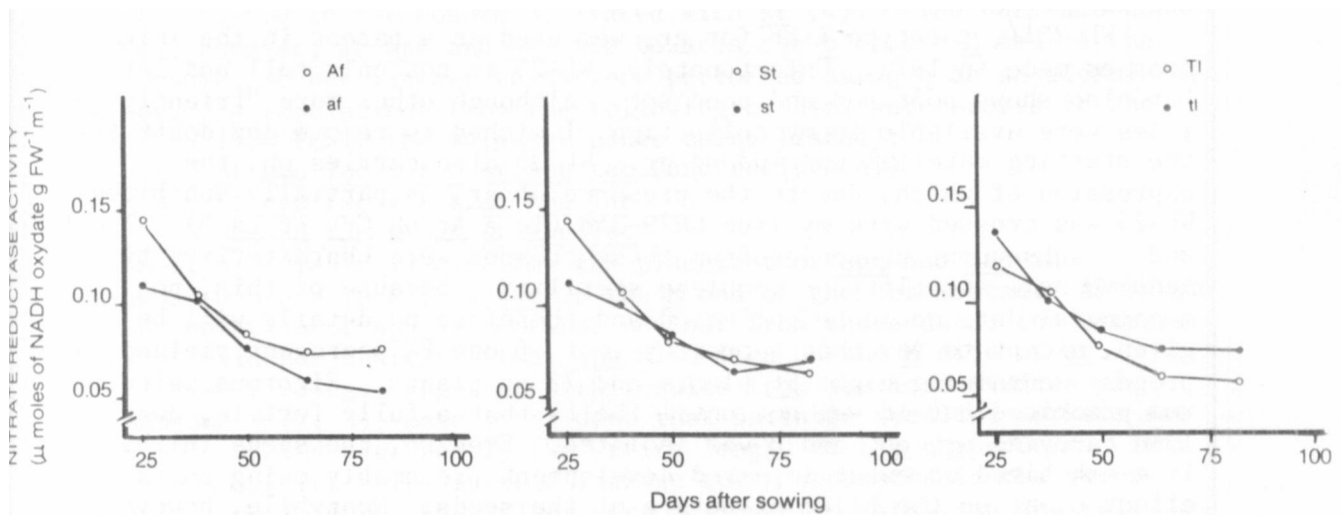


Fig. 1. Nitrate Reductase Activity (NRA) during plant development in near-isogenic lines based on the allelic status of af, st, and tl.