INVERSION OF THE ASSOCIATION AMONG PROTEINS AND SUGARS WHEN COMPARING THE GREEN PEA AND DRY SEED STAGES

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Previous work (1) indicated that the correlation among protein and sugar content at the dry seed stage was positive and significant, whereas that for the green pea stage for the same parameters was negative, thus indicating a possible Inversion of this association.

This finding was confirmed in a different set of lines by means of a path-coefficient analysis of proteins vs. sugars. The total correlation for proteins vs. sugars was positive in both stages, but in the green pea stage there was no detectable correlation at all (r = .0545). However, in the path-coefficient analysis the direct effects showed a clear negative (-.4259) relationship, and that pooled indirect effects of alcohol insoluble solids (AIS) and dry matter (MS) shift the sign to positive (see Table 1). In the case of dry seed the pooled Indirect effects have a negative sign, but the direct effect remains positive and is of great magnitidue (.8445).

Table 1. Direct effect, pooled indirect effect, and total correlation of sugars, alcohol insoluble solids (AIS), and dry matter (MS) with proteins of pea seeds at the green and dry stages of maturity.

	% Proteins[1] green pea			% Proteins[1] dry seed		
	Direct effect	Pooled indirect effect	Total correlation	Direct effect	Pooled indirect effect	Total correlation
Sugars (%)[1]	-.426	.480	.055	.845	-.116	.728**
AIS (%)[1]	-.415	.149	-.265	-.022	.444	-.466**
MS (%)	-.311	.119	-.192	.183	-.614	-.431*

[1] Dry matter basis * P = .05 ** P = .01

Table 2 shows the relations among yields (green and dry) with sugars, proteins, AIS, and MS. The path coefficient analysis confirms the signs of the associations between yields with proteins and sugars at both stages (see signs of direct effects). Thus, as suggested by Pandey and Gritton (2), and later by the author (3), selections made at the dry seed stage for high protein content would not necessarily result in genotypes with low seed yields. To this we can now add that when selecting for higher protein content, we would be also selecting for higher sugar content at this stage. This would not be true at the green pea stage.

Table 2. Direct effect, pooled indirect effect, and total correlation of sugars, proteins, alcohol insoluble solids (AIS), and dry matter (MS) with green pea and dry seed yields in pea.

	Green pea yield[1]			Dry seed yield[1]		
	Direct effect	Pooled indirect effect	Total correlation	Direct effect	Pooled indirect effect	Total correlation
Sugars (%)[1]	.047	-.267	-.220	-.383	.106	-.277
Proteins (%)[1]	-.254	-.065	-.319	.353	-.395	-.042
AIS (%)[1]	-.051	.210	.159	.346	.024	.370
MS (%)	.421	-.004	.417*	-.105	.325	.220

[1] Dry matter basis * P = .05 ** P = .01

1. Krarup, A. 1980. PNL 12:40.
2. Pandey, S. and E. T. Gritton. 1975. Crop Sci. 15:353-356.
3. Krarup, A. 1977. PNL 9:25.

FURTHER STUDIES OF AN INTERCROSS IN PISUM

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In 1980 (5) I gave an account of my results from the application of the intercross method to L-114,T(4-6)a and L-58,T(4-6)b. In these lines the T-points are located in proximity to the centromeres with the effect that chiasmata are not formed in the interstitial segments. Under the microscope it is not possible to distinguish with certainty between the karyotypes of these lines and those of normal structural type as represented by L-110 t(cf. Fig. 1) and (1)]. However, in L-114 the T points are situated in the long arms and in L-58 in the short arms of the chromosomes involved.

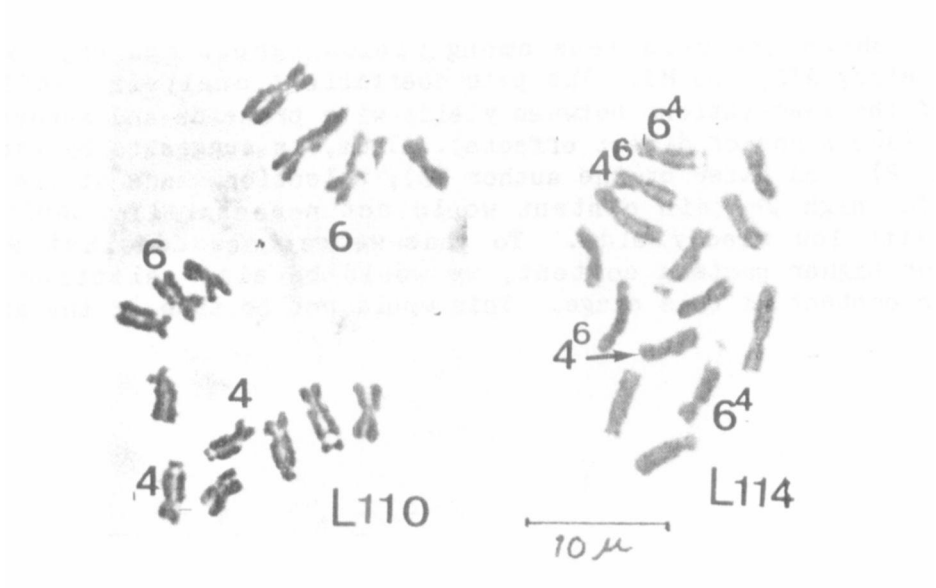

Fig. 1. Mitosis in root tips of L-110 (standard for the normal structural type) and L-114,T(4-6)a.