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## Identification of multiple aleurone in CG Coroico Flour

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The aleurone layer in maize seeds consists of the single, outermost layer of endosperm cells just below the pericarp. Maize populations with seeds exhibiting aleurone layers of 2-4 cell layers or more were found among the Coroico/Piricincó racial complex from Bolivia and Peru (Figure 1; Welch et al., 1993; Wolf et al., 1972). This multiple aleurone trait is controlled by a single, partly dominant gene and kernels with the trait have been found to be substantially higher in protein and mineral content, making the trait useful for the nutrient enhancement of maize.

Our interest was in finding the extent to which existing work with Coroico germplasm has already resulted in northern adapted populations that carry the trait. Cargill released to the USDA a temperate adapted population called Cargill North Temperate Zone Coroico. Kannenberg and others at the University of Guelph in Ontario selected this population for earliness and released it as CG Coroico Flour (Lee et al., 2006). We examined these populations, three Coroico/Piricincó populations from Bolivia and Peru, three inbred lines from the Maize Genetic Stocks Center carrying the multiple aleurone trait, and three adapted inbreds from Minnesota and Manitoba to see how prevalent the trait was among these sources.

Following the methods of Welch et al. (1993), kernels were soaked in water overnight and then sectioned with a razor blade. Sections were stained with amido black in a 7% acetic acid solution to improve visibility of the aleurone cells under light microscopy. As described by Wolf et al. (1972), the North American lines did not exhibit the trait and few sources with the multiple aleurone trait appeared to have the trait fixed (Table 1). Seeds with multiple aleurone layers were found in decreasing proportions from the original Coroico, to the Cargill population, to CG Coroico Flour. Also, when present, the second aleurone cell layer in CG Coroico Flour seeds was largely limited to the crown of the seeds and was usually discontinuous, unlike the original Coroico populations. Whether this was due to a heterozygous state, the loss of modifier genes during selection, or some other cause is unknown. However, having this trait in this early maturing population should help plant breeders interested in using it in early maturing cultivars.

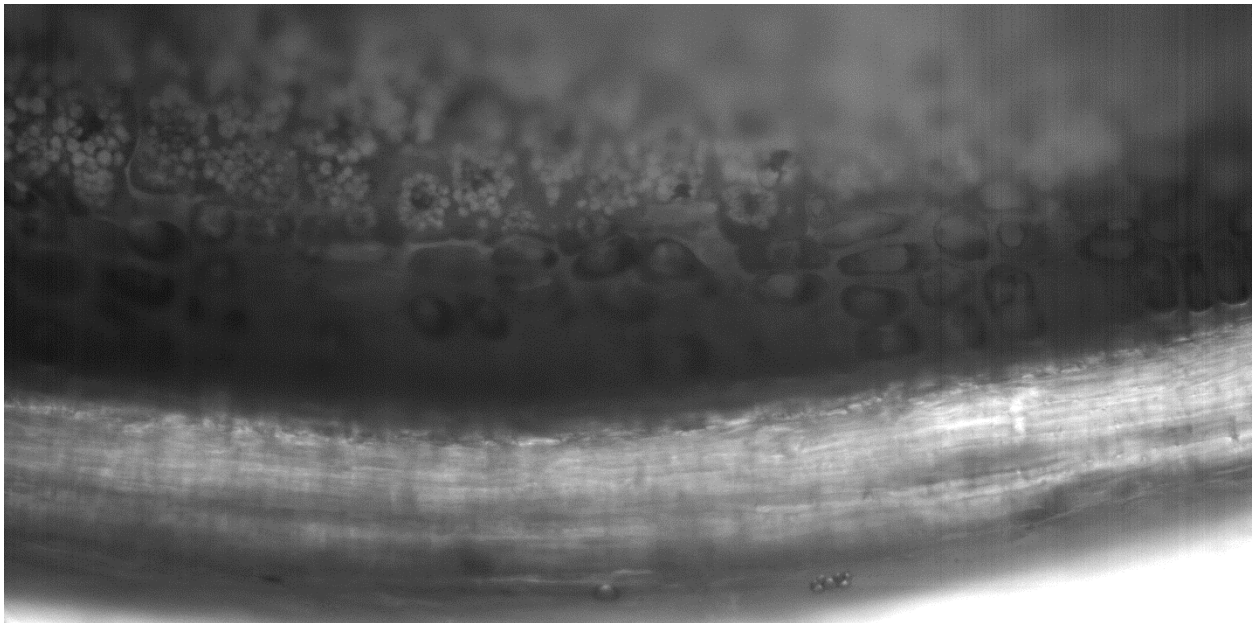
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## References

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**Figure 1.** Stained section of kernel from Loreto 8 showing 3-4 aleurone cell layers between the normal endosperm cells at the top and the pericarp below.



**Table 1.** Results of aleurone cell layer counts for selected North American and Coroico populations of maize.

Variety	# Seeds Examined	Single Layer	Multiple Layers	% Multiple Layers
A681	10	10	0	0
A682	10	10	0	0
CM7	10	10	0	0
Stock 5708E	10	4	6	60
Stock 5708F	10	0	10	100
Stock 5708G	10	2	8	80
Bolivia 792	100	81	19	19
Loreto 8	60	2	58	97
Coroico Composite	99	54	45	45
Cargill North Temperate Zone Coroico	96	73	23	24
CG Coroico Flour	119	107	12	11