

Breeding Colored and High Lysine Prime Eating Stage Sweetcorn

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Introduction

Eating stage sweetcorn is typically yellow or white and like mature corn or popcorn, is deficient in essential amino acids like lysine and tryptophan. The *opaque-2* (*o2*) mutation found of Quality Protein Maize (QPM) decreases the production of zeins shifting the proteome towards the production of more lysine-rich non-zein proteins in the endosperm. Previous research has successfully integrated the *o2* mutation into popcorn varieties while maintaining vitreousness, popability, size, and morphology.²

To improve sweetcorn nutritional quality this project in **publicly available sweetcorn** varieties, this project has two major goals.

1. Breed the *o2* high lysine trait into sweetcorn and test and exploit the potential of **Quality Protein Sweetcorn (QPS)**.

2. Breed a variety of colors into eating stage sweetcorn. Anthocyanins and carotenoids have antioxidative benefits.¹ Kernels contain these pigments in the pericarp, aleurone and to some extent the starchy endosperm of the kernel. This project is integrating pigments from various colored corn varieties into sweetcorn lines to develop varieties that express pigment during the prime eating stage.

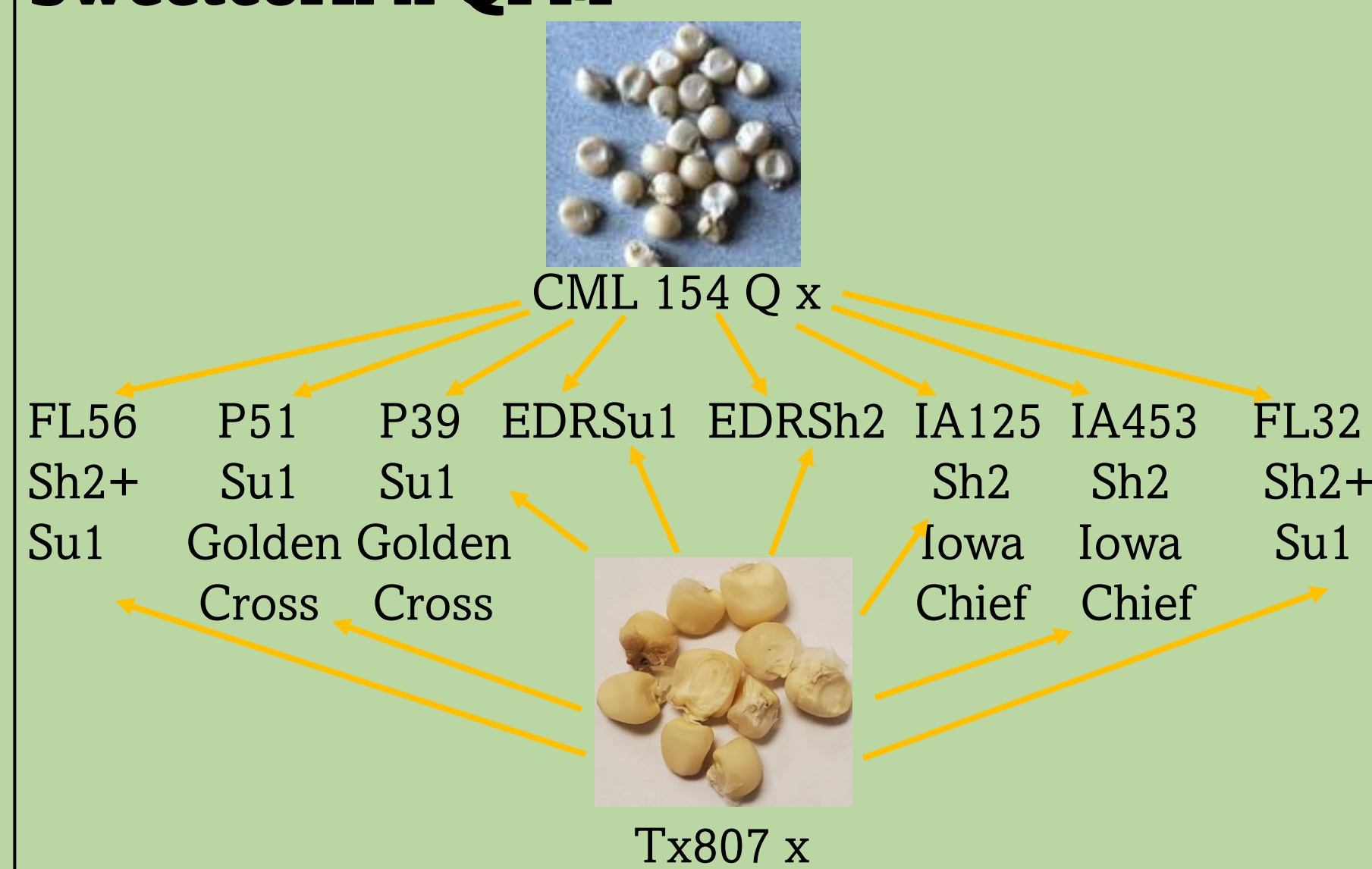
Objectives

1. Breed varieties of sweetcorn with the *o2* mutation, developing high lysine sweetcorn varieties.
2. Breed varieties of sweetcorn displaying pigmentation 20-25 days after pollination, for visually appeal and antioxidant properties.
3. Later breed varieties of sweetcorn that combine both previous goals, developing antioxidant and lysine rich sweetcorn varieties.

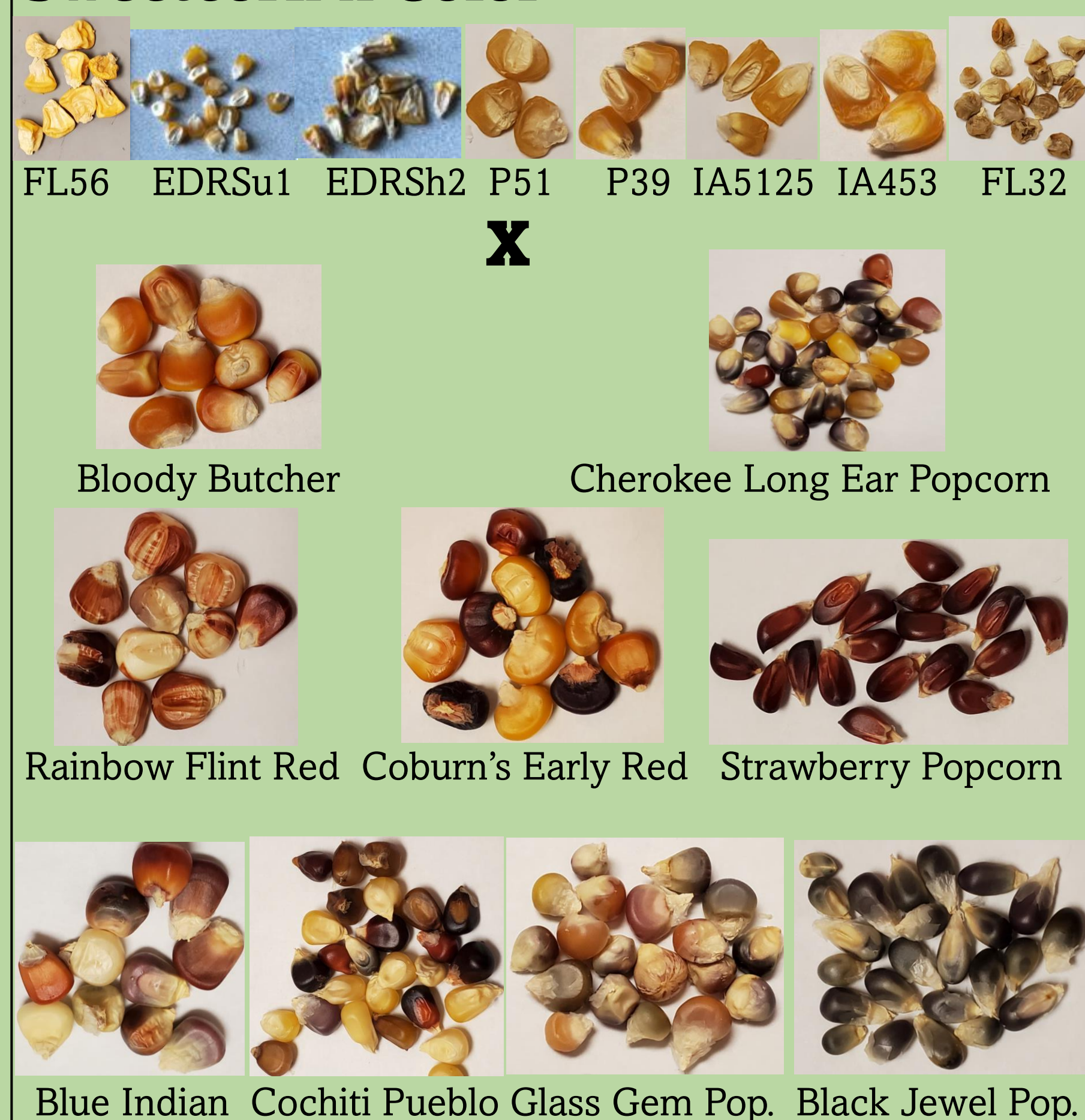
Parents

Summer of 2020

Sweetcorn x QPM

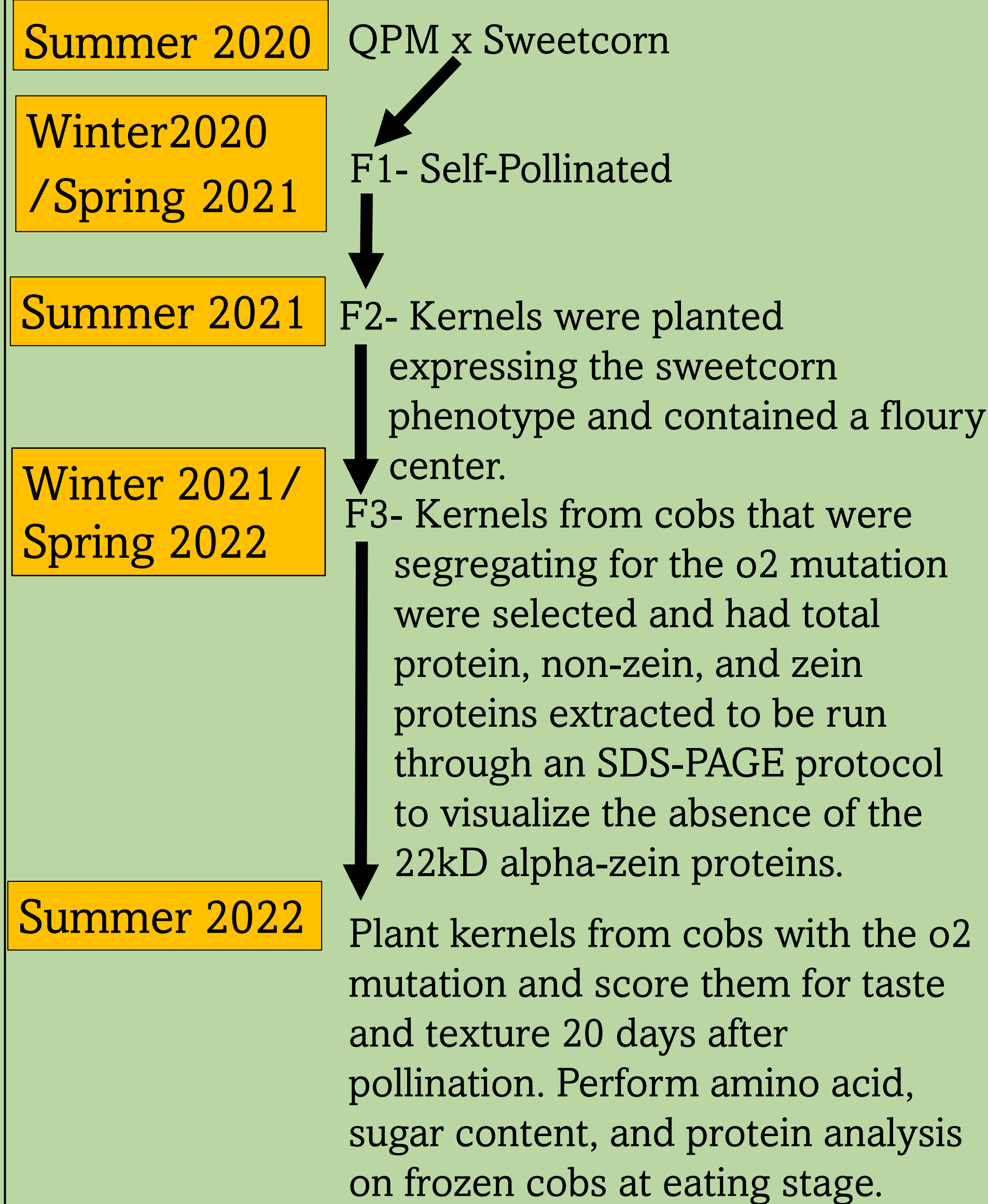


Sweetcorn x Color



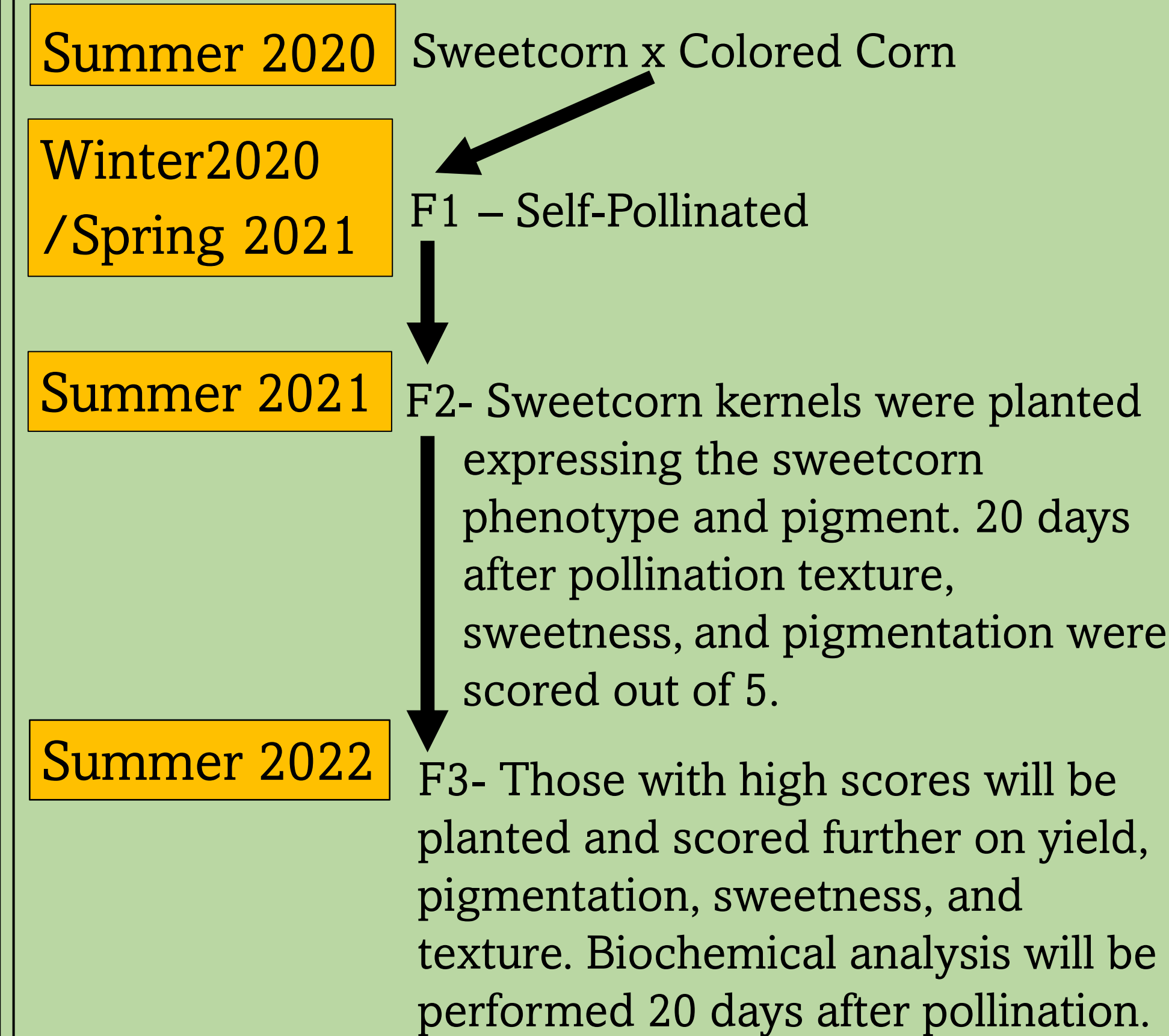
Breeding Scheme/Sweetcorn x QPM

Sweetcorn x Quality Protein Maize

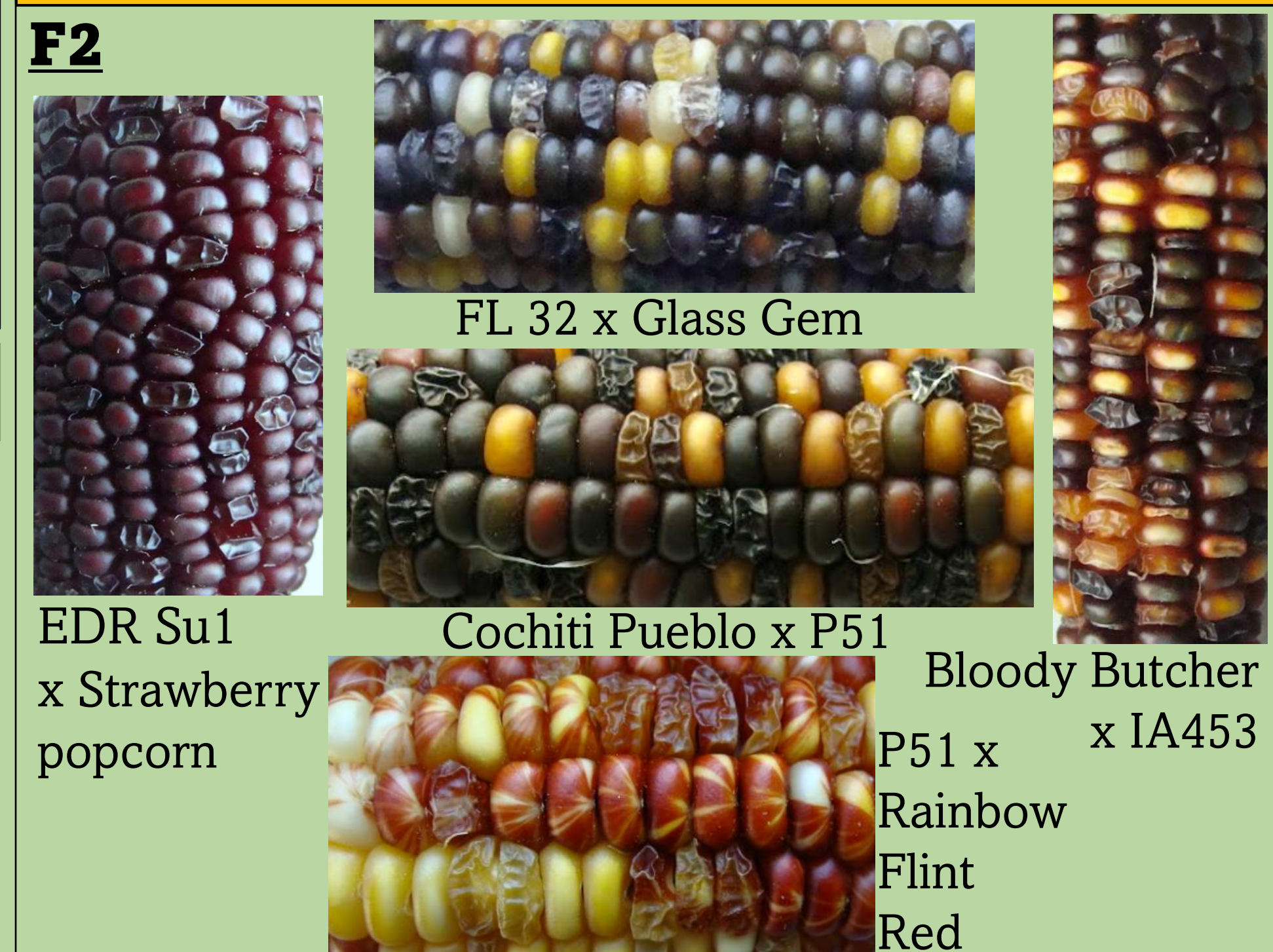


Breeding Scheme/Sweetcorn x Color

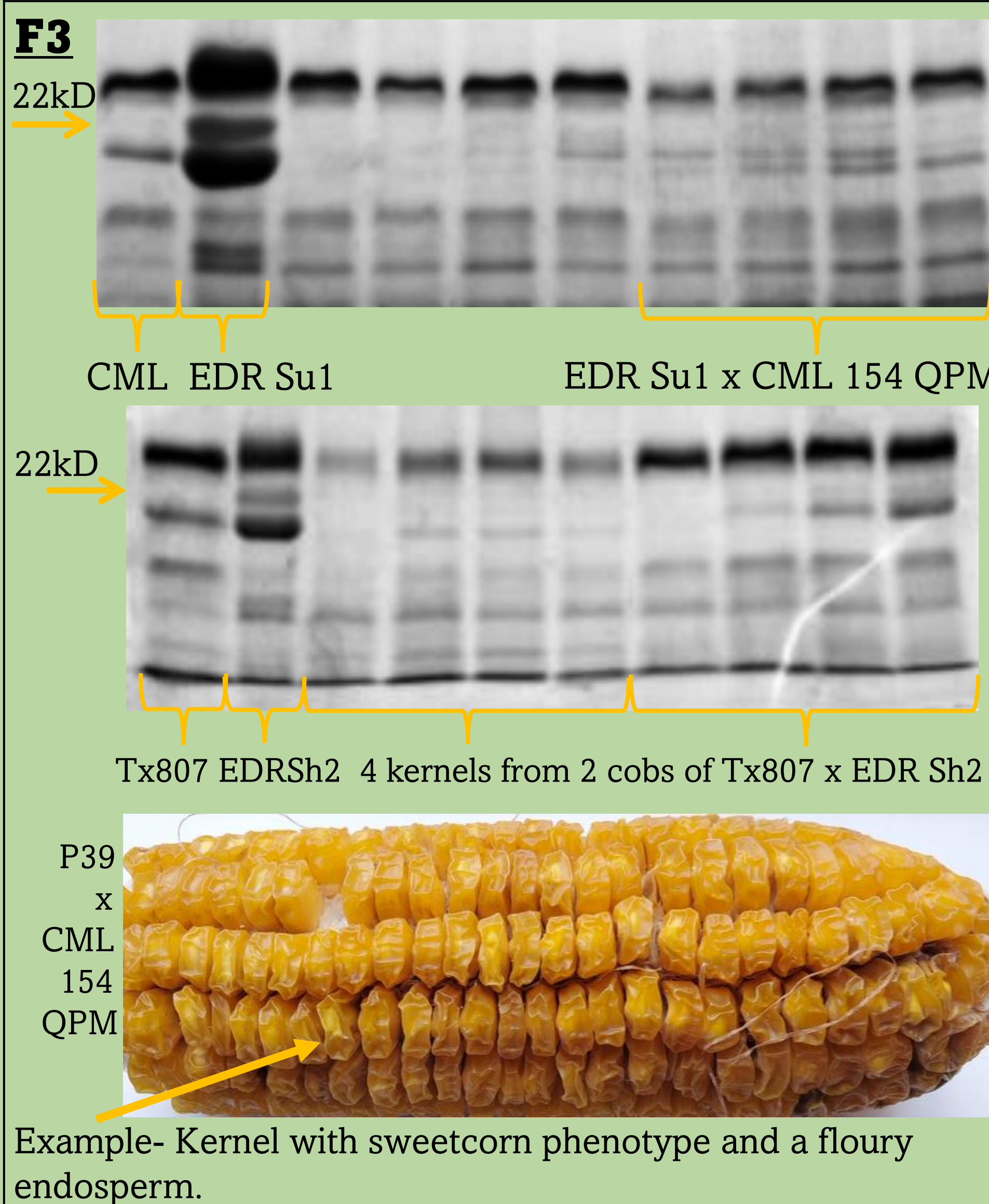
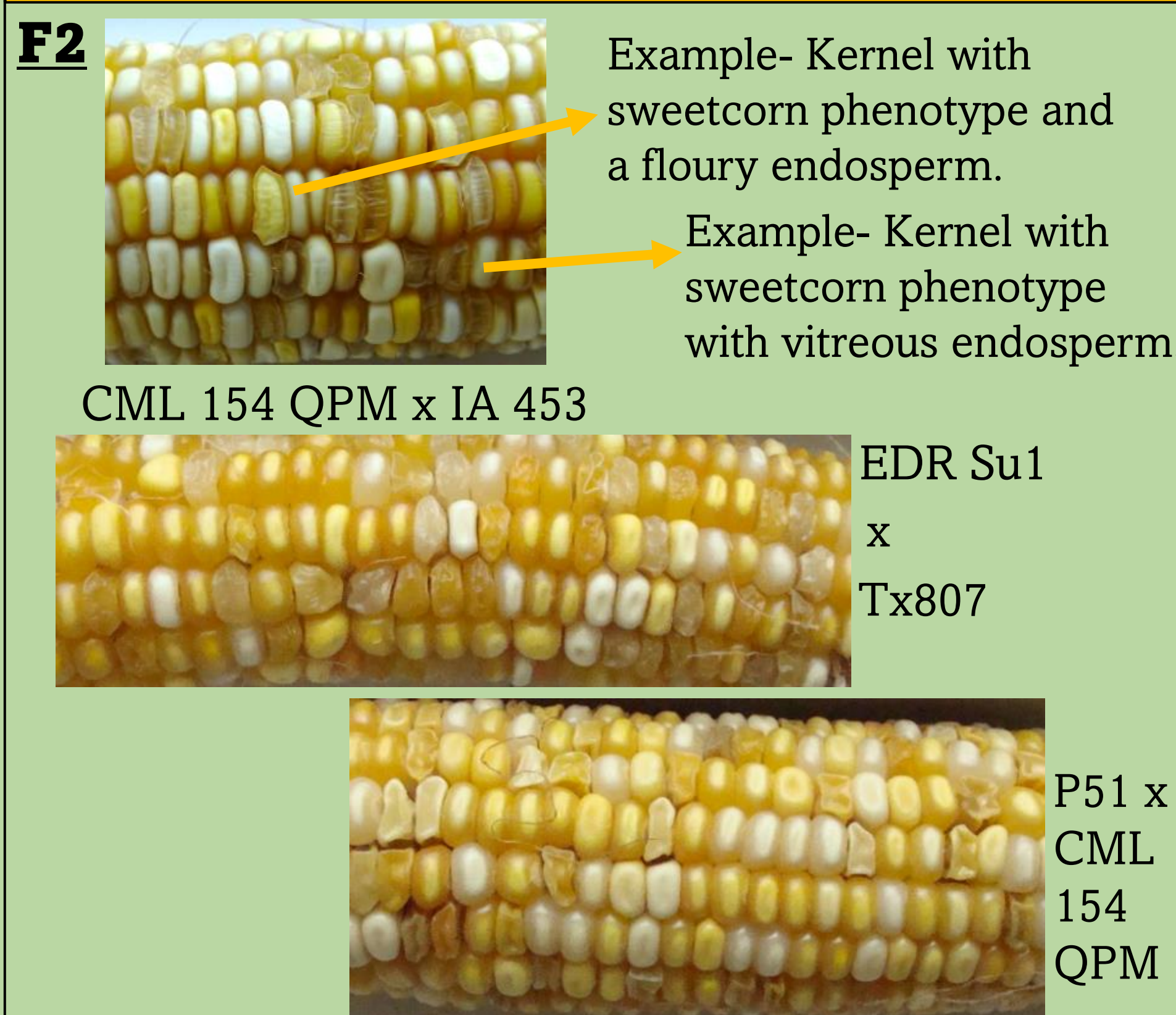
Sweetcorn x Color



F2/F3

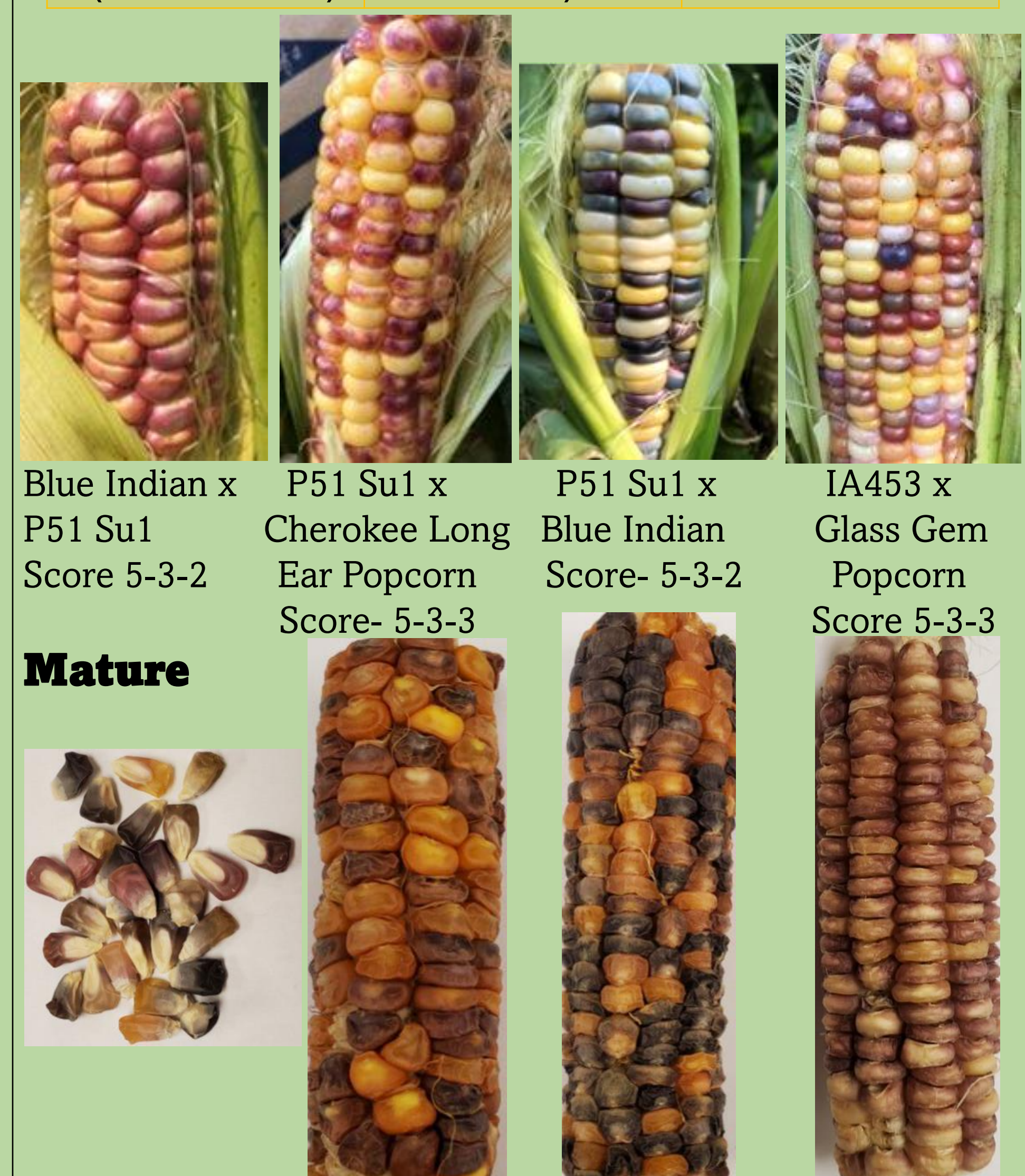


F2/F3



F3 20 Days After Pollination

Color Appearance	Sweetness	Texture
1 (White or Yellow Color) - 5 (Vivid Colors)	1 (Not Sweet) - 5 (Acceptable Sweetness)	1 (Very tough) - 5 (Very tender)



Bibliography

1. Petroni, Katia, et al. "Anthocyanins in Corn: A Wealth of Genes for Human Health." *Planta*, vol. 240, no. 5, Aug. 2014, pp. 901-11. <https://doi.org/10.1007/s00425-014-2131-1>.
2. Ren, Ying, et al. "Generation and Evaluation of Modified Opaque-2 Popcorn Suggests a Route to Quality Protein Popcorn." *Frontiers in Plant Science*, vol. 9, Dec. 2018. <https://doi.org/10.3389/fpls.2018.01803>.

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