Wisconsin Fast Plants™

Seed Stock Profile

F_1 and F_2 Generations of

Non-Purple Stem, Yellow-Green Leaf

Single, recessive traits: *anl/anl* and *ygr/ygr*

The F_1 (hybrid) generation is produced by crossing two parent stocks, each of which is homozygous for its recessive, namesake trait. The Non-Purple Stem parent genotype is *anl/anl, YGR/YGR.* The Yellow-Green Leaf parent genotype is *ANL/ANL, ygr/ygr.*

Crossing the two parents yields hybrid offspring that are heterozygous for both traits (*anl/ANL, YGR/ygr*). They are not phenotypically similar to either parent, displaying purple stems and green leaves. This illustrates the principle of *dominance.*

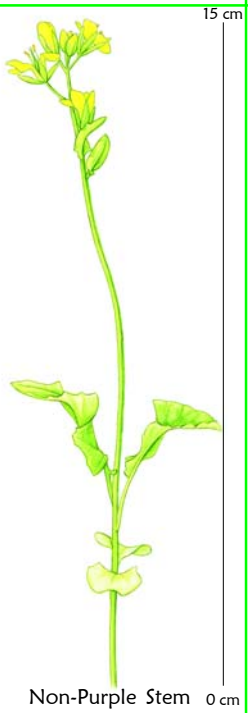
The F_2 generation is produced by intermating the F_1 population and harvesting the seeds. The plants in this generation segregate in a 9:3:3:1 ratio of phenotypes. (See back page for details.) This illustrates two Mendelian principles: the *Law of Segregation* and the *Law of Independent Assortment.*

Anthocyanin is a purple pigment that may be visible on hypocotyls, stems, leaf tips, and hydathodes. In the homozygous, recessive condition (*anl/anl*), plants do not produce anthocyanin, and they appear bright green.

In the homozygous, recessive condition for yellow-green leaf color (*ygr/ygr*), the cotyledons, leaves, stems, and developing seed pods are a pale, yellow-green color.

Length of life cycle: 35-45 days
Days to flowering: 15
Average plant height at day 15: 15 cm

15-day-old plant



Non-Purple Stem Yellow-Green Leaf (*anl/anl, ygr/ygr*)

7-day-old plants

Non-Purple Stem Yellow-Green Leaf (*anl/anl, ygr/ygr*)

Non-Purple Stem Green Leaf (*anl/anl, -/YGR*)

Purple Stem Yellow-Green Leaf (*-/ANL, ygr/ygr*)

Purple Stem Green Leaf (*-/ANL, -/YGR*)

Growing Tips

- 24-hour fluorescent light, water, and fertilizer are essential for Wisconsin Fast Plants™. Refer to *Growing Instructions* for more details.
- Prior experience growing Standard WIsconsin Fast Plants™ is useful for comparison with Non-Purple Stem, Yellow-Green Leaf plants.
- Purple color is best observed on the hypocotyls (stems) when the plants are 4-7 days old. The purple color will intensify with increased light or decreased nutrients. Petri-plate germination yields a deeper purple color than pot-grown plants, but is not recommended for observing the yellow-green trait.

Mendelian Genetics with a Dihybrid Cross Using Wisconsin Fast Plants™

Parent Generation	P_1	x	P_2
Genotype	*anl/anl, YGR/YGR*		*ANL/ANL, ygr/ygr*
Phenotype	non-purple stem, green leaf		purple stem, yellow-green leaf

Cross P_1 x P_2 plants

Hybrid (F_1) Generation	F_1
Genotype	*anl/ANL, YGR/ygr*
Phenotype	purple stem, green leaf

Intermate plants of the F_1 generation

F_2 Generation	9	3	3	1
Genotypes	*-/ANL, YGR/-*	*-/ANL, ygr/ygr*	*anl/anl, YGR/-*	*anl/anl, ygr/ygr*
Stem Phenotypes	purple	purple	non-purple	non-purple
Leaf Phenotypes	green	yellow-green	green	yellow-green

Written by Wisconsin Fast Plants Program 2001. Layout by Sarah Lauffer. Color art by Alison Schroeer. Line art by Amy Kelley.

Tips for a Dihybrid Cross with the *anl* and *ygr* Genes

To ensure high seed yields, follow the *Growing Instructions* carefully. Expect an approximate 9:3:3:1 ratio of plants in the F_2 generation. Due to the random nature of gamete segregation, an exact 9:3:3:1 ratio is unlikely to be observed. Use the ratio as the foundation for understanding the Law of Segregation and the Law of Independent Assortment. Try graphing the data to see patterns, or do a χ^2 test to estimate the probability of the results. A dash (-) in the genotype indicates that either allele may be present (*i.e.*, *anl* or *ANL; ygr* or *YGR*) with no phenotype effect. See *www.fastplants.org* for details about how to do this dihybrid investigation, or for information about the companion monohybrid investigation.