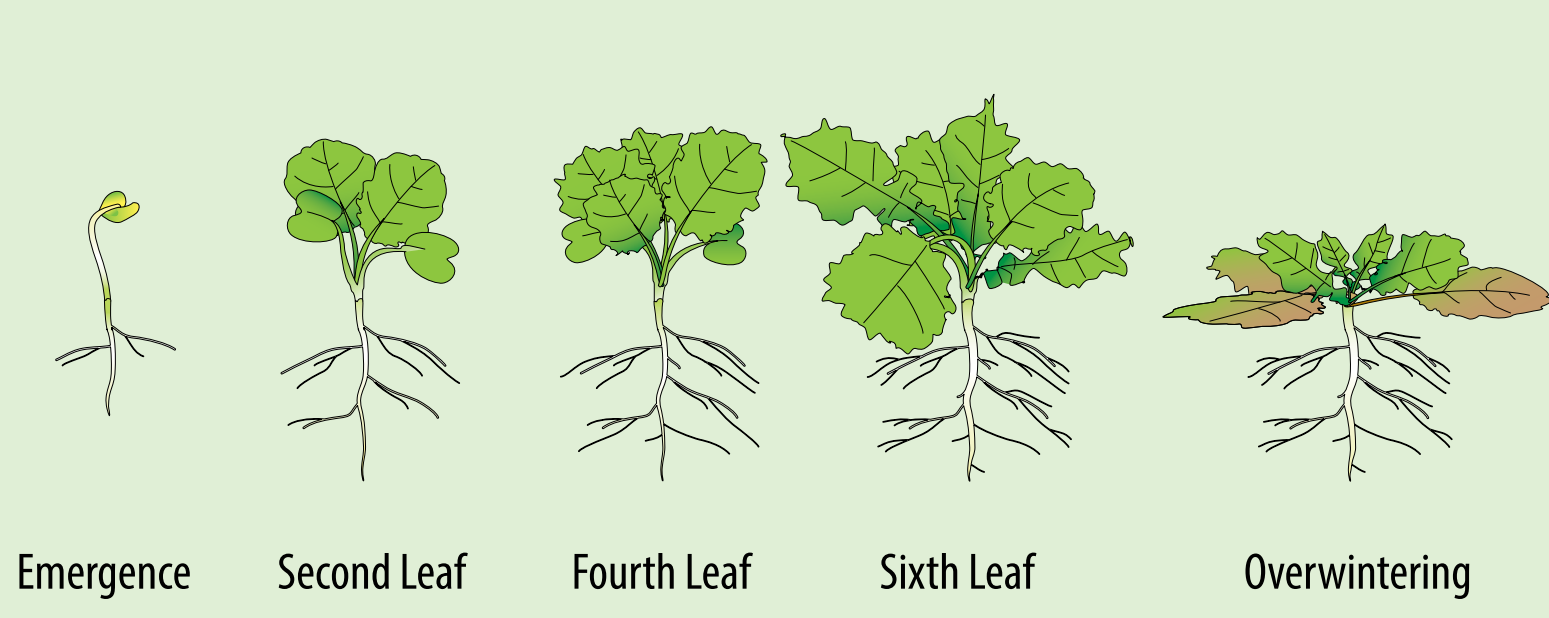
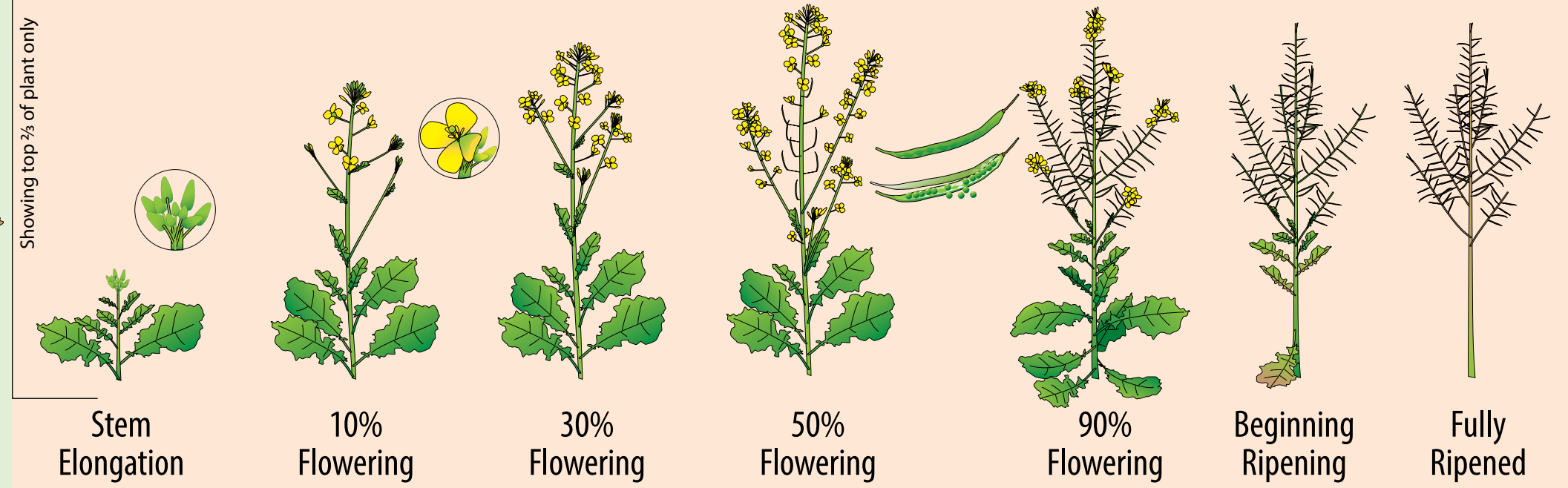


Vegetative



Emergence Second Leaf Fourth Leaf Sixth Leaf Overwintering

Reproductive



Stem Elongation 10% Flowering 30% Flowering 50% Flowering 90% Flowering Beginning Ripening Fully Ripened

Canola Development Stages

Emergence

The hypocotyl pulls the cotyledons above the soil surface. The growing point is between the two cotyledons. The taproot grows vertically and the secondary roots and root hairs grow, capturing water and nutrients.

Management: Insecticide-treated seed protects against flea beetle, green peach aphid, and turnip aphid. Consider spraying the field margins for grasshoppers. Fungicide-treated seed protects against damping off and seed-borne blackleg but does not protect against blackleg from crop residue.

Second leaf

Two leaves fully expanded. The rate of leaf expansion is 7 to 10 days per leaf. Rapid canopy establishment improves light, water, and nutrient capture.

Management: Scout for insects, weeds, and diseases. Watch for shot holes and windowpanes from diamondback moth and armyworm larvae feeding and for blackleg lesions on leaves. Control annual broadleaf and grassy weeds.

Fourth leaf

Four leaves fully expanded. The total number of leaves a plant produces depends on factors such as genotype, planting date, seeding rate, nutrition, temperature, and moisture.

Management: Complete weed control by 4 to 6 weeks after emergence. Include a foliar insecticide with the herbicide if needed. Apply a foliar fungicide if blackleg lesions are present.

Sixth leaf

Six leaves fully expanded. This is the minimum number of leaves needed before dormancy. Canola may produce 10 to 15 leaves on the main stem. The end of leaf development coincides with vernalization.

Management: Continue scouting for blackleg lesions. Nutrient and water demands increase until the overwintering stage.

Overwintering

Canola overwinters in the rosette stage. The stem thickens. The plant produces smaller leaf cells with a higher concentration of soluble substances, increasing freeze tolerance.

Management: Apply nitrogen in a split approach, with a quarter to a third applied preplant and the remainder top-dressed at spring greenup. Sulfur is also critical and can be applied in the fall or with the nitrogen top-dress. Apply herbicides as the plant resumes growth in the spring. Scout for army cutworm.

Roots

Canola is a tap-rooted crop with many lateral, fibrous roots. These roots have a mellowing effect on soil structure. For all subsequent growth stages, only the top two-thirds of the plant is illustrated.

Stem elongation

Growth resumes when days lengthen and average temperatures reach 40 degrees Fahrenheit. Stem elongation (bolting) begins with leaf expansion and the initiation of flower buds. In the axils of the upper leaves, branches form from buds. Each branch develops one to four leaves and a flower bud cluster. Fifteen to 20 leaves develop.

Management: Nutrient demand increases significantly and the plant is moderately tolerant to hard freezes at this stage.

10% Flowering

10 percent of the flowers are open. Flowering begins when the first floret opens, usually on the lowest buds on the main stem and continuing upward, with three or more flowers opening each day. Secondary branches begin flowering 2 to 3 days later.

Management: Drought and heat may limit branching and reduce yield. Freezing temperatures affect open buds. Damage can be observed as a bend in the raceme and aborted flowers.

30% Flowering

30 percent of the flowers are open. Seeds per pod are defined once the flower is open. A reduction in photosynthetic capacity can cause flower abortion, reducing potential pods and seeds per pod. About 60 percent of open flowers become productive pods.

Management: Evaluate the risk for sclerotinia stem rot, especially if the field or neighboring fields have a history of canola. Fungicide applications should be made at 30 to 50 percent flowering to control sclerotinia.

50% Flowering

50 percent of the flowers are open. Flowers that opened in the first 10 days and were successfully pollinated are forming pods and seeds. Flowering usually lasts 30 to 40 days. A healthy pod canopy is critical for seed development. Maximum plant height is attained.

Management: Several flowers can be lost due to stress conditions and the plant can still recover if leaf, stem, and pod areas remain undamaged as conditions improve. Scout for insect pests that feed on flowers and pods.

90% Flowering

90 percent of the flowers are open. Active seed formation is progressing in early-formed pods, and more pods are developing. Competition for resources between opening flowers and pods interrupts flowering. Pods are expanding rapidly, reaching maximum fresh weight and length by the mid-point of grain fill.

Management: Powdery mildew and *Alternaria* spp. may reduce pod and seed set if wet conditions are prevalent at late flowering/early pod filling. Foliar fungicides may be applied.

Beginning ripening

This occurs when the pods turn from yellow to brown, becoming brittle as they dry. Seed color and coat are changing and drying out. Grain filling typically lasts 35 to 55 days. Maximum seed dry weight is reached at 70 days after flowering. Seed moisture is lost at roughly 2 to 3 percent per day.

Management: Manage harvest operations. Swathing may occur between 30 to 60 percent of seed color change. Desiccants may be applied to hasten dry down between 75 to 85 percent of seed color change.

Fully ripened

Seeds are mature and losing moisture, and final seed weight has been achieved. All pods have reached maturity and are split easily along the center membrane.

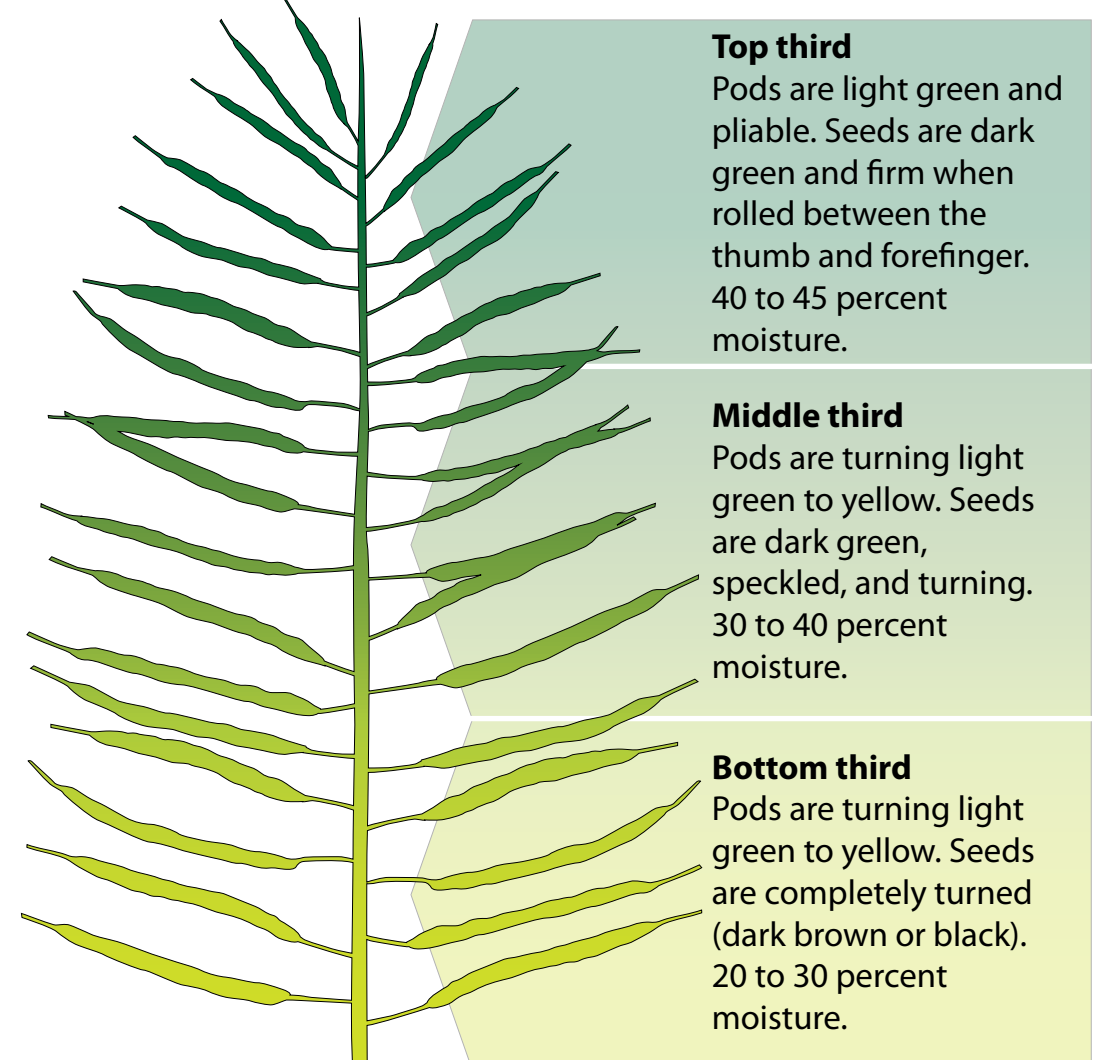
Management: Harvest should occur at 8 to 10 percent seed moisture. Begin harvest as soon as the crop is fully ripened. Canola swathed in a windrow ripens in 4 to 12 days.

Pod and Seed Development Timeline

Specific results are environment and cultivar dependent

	Day 1 – First buds open and fertilization of the ovule occurs.
	Day 15 – Seed expansion begins; seeds are watery and translucent.
	Day 20 – Pods nearing full length; seed fill begins with rapid embryo growth and protein accumulation.
	Days 35 to 55 – Seed oil synthesis.
	Day 40 – Maximum pod fresh weight and length achieved. Seed development complete at 35% of mature dry weight.
	Days 50 to 72 – Pod walls reach maximum fresh weight and seed moisture loss begins.
	Day 60 – Seed oil synthesis complete at 40% seed color change. Seed is 70% of final dry weight.
	Day 65 – 60% seed color change.
	Day 70 – Seeds reach maximum dry weight.
	Day 80 – Pods and seeds fully ripened.

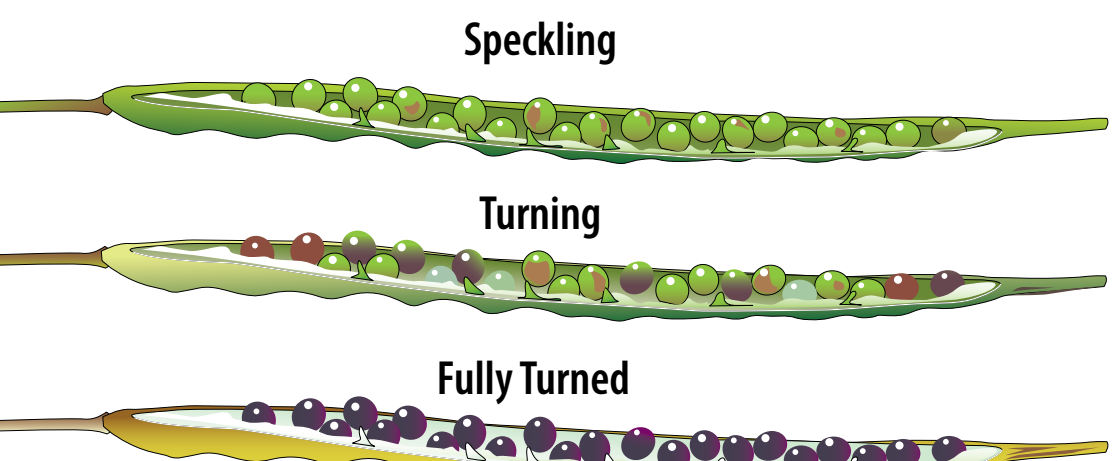
50 percent seed color change on the main stem



Top third
Pods are light green and pliable. Seeds are dark green and firm when rolled between the thumb and forefinger. 40 to 45 percent moisture.

Middle third
Pods are turning light green to yellow. Seeds are dark green, speckled, and turning. 30 to 40 percent moisture.

Bottom third
Pods are turning light green to yellow. Seeds are completely turned (dark brown or black). 20 to 30 percent moisture.



Speckling

Turning

Fully Turned

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