Chapter 5

2-*Brassica napus L.*

Brassicaceae (Cruciferae)

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INTRODUCTION

- Canola or Rapeseed are the important crop of Brassica group grown as oilseed crops in the world. These have remained one of the major sources of oil. Rapeseed and mustards are rich source of oil and contains 44 – 46% good quality oil. In addition, its meal has 38 – 40% protein that has a complete profile of amino acids including lysine, methionine and cystine. After many years of breeding and selection in Canada, canola was developed with lower erucic acid in the oil and low glucosinolate content in the meal to be more valuable as cooking oil and an excellent feed for animals and birds especially for poultry.

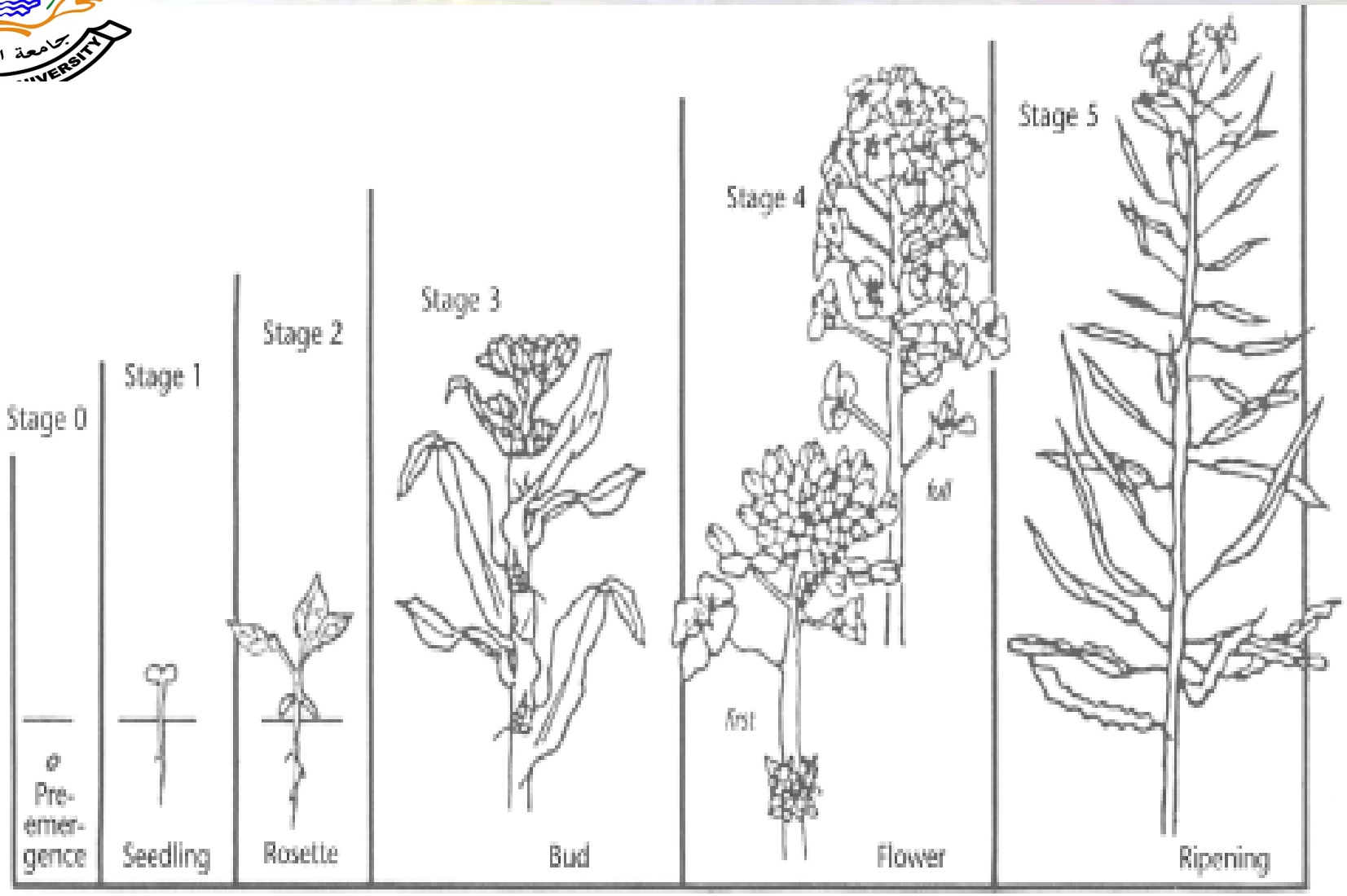
Growth Stages

- Canola growth is characterized by six main growth stages.
- I. Pre-emergence stage: The germinating seedling may take from 4 to 10 days to emerge. During this time it is susceptible to many soil borne pathogens therefore seed treatment is necessary.
- II. Seedling Stage: In this stage the seedling very young plant has just emerged from the soil. Cotyledons are pushed through the soil surface by an active hypocotyl. At this stage, the seedling is still vulnerable to many soil pathogens, and to flea beetle infestation.
- III. Rosette stage: This stage is the rosette stage characterized by an increasing leaf area index. Spring canola will remain in this vegetative stage for several weeks. Winter canola also stays in this stage for several

IV. Budding stage: Increasing day length and temperatures initiate bolting and the beginning of the bud stage. The plants reach their maximum leaf area index at this time along with 30 to 60% of its total dry matter. A large accumulation of foliage is required to provide adequate sugars during flowering and pod fill.

V. Flowering stage begins and continues for 14 to 21 days. Three to five flowers open per day and 40 to 55% of the flowers that open will develop pods.

VI. Ripening stage begins when the petals fall from the last formed flower on the main stem. Pod fill is complete 35 to 45 days after flower initiation, and the seeds contain about 40% moisture at this point. The crop is considered ripe and ready for swathing when 30 to 40% of the seed from pods on the main stem have turned color.


Stage 0
Stage 1
Stage 2
Stage 3
Stage 4
Stage 5
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Seedling
Rosette
Bud
Flower
Ripening
Vegetative Stages
Reproductive Stages

Description of Canola Plant

- **Roots:** Canola has a taproot system. Growth is rapid after establishment with 85 % of the root dry matter in the top 25 cm of soil. Secondary roots grow laterally from the taproot.
- **Stems:** Stem height varies between 75 and 175 cm with five to seven branches per plant. Secondary branches can also develop in the axils of bracts on the primary branches. Stems are important for photosynthesis. Widely spaced plants are usually branched extensively, which compensates for yield losses.
- **Leaves:** Plants produce up to six large, waxy, blue-green leaves per stem. Leaf blades partially clasp the stem. After emergence, canola develops a thick rosette of leaves close to the ground before appearance of the flowering stem. The number Leaves on each main stem is between nine and 30.

- **Flowers:** Canola has small, yellow flowers. Flowering commences on the main stem, which becomes the terminal inflorescence or raceme and proceeds acropetally, i.e. from the base towards the tip of the raceme.
- **Seeds and pods:** Seeds are relatively small (280 000 to 340 000 seeds per kilogramme) and round black, brown or yellow. Mature pods contain about 23 seeds. Canola pods develop firstly on the lower stem, and consecutive pods will form towards the top of the plant. Pods on the lower parts of plants are about 30 cm from the soil surface. Matured plants can reach 1,7 m in height, depending on the cultivar and growing conditions. Pods are prone to shattering if the harvest process is delayed.

Statistical of Production

- The word total planted area from Canola was 34.7 million hectares produced about 76.2 million tons with average of 2194 kg/ha.
- The highest harvested area from Canada cultivated 8.4 million hectares, and highest production from Canada was 21.3 million tons. The highest productivity per unite area from Belgium was 4260 kg/ha.

Environmental requirements

- Rapeseed or canola crops are grown in tropical and temperate zones. These grow well from an altitude of 650 – 1500 meters. A warm weather (20°C) during seed germination, 15°C – 20°C during plant growth and long sunny bright days (25°C – 27°C) at flowering and pod formation are most suitable for these crops. Rapeseed and canola grow best under relatively cool temperatures upto flowering. These crops grow profusely at 30 – 60% relative humidity.

Soil

- Rapeseed can be grown on a wide range of soils including both light and heavy soils. Crop can tolerate a variable range of pH from 5.5 to 8.0. However, the most suitable soils are those that are:
- Deep and free from hardpan, allow good taproot development, uniformly textured, allow even establishment.
- Unlikely to crust after rain, so that the seedling can emerge easily.
- Not prompt to water logging, rapeseed will tolerate winter water logging.
- Not Acidic with high aluminum and manganese levels.

Seed bed preparation

- Field preparation depends upon the kind of soil, previous crop and more on intensity of weeds. Sandy loam soils are easy to prepare but require much labour in reducing the menace of some perennial grasses. This requires a comprehensive, deep ploughing, harrowing, collection of stubbles of these grasses and finally planking to conserve the soil moisture. The land is repeatedly ploughed with soil turning plough followed by cross harrowings and planking during cool hours, preferably during night or very early hours of the day. A clean and well pulverized seedbed of good tilth is prepared.

Sown date

- Canola or Rapeseed are highly photo-sensitive crops.
- Sowing early or late, both have been reported to be harmful. Loss in yield, due to delayed sowing cannot be compensated by higher seed rate or higher doses of fertilizers.
- The suitable planting date in Egypt for different religions from mid-October to mid-November.

Seeding Rate

- Yields are not affected significantly due to varied plant densities. Moderate adjustments in seed rate have little effect on yield. Thin crop stand compensate by extra branching. However, recommended seeding rates are 2 to 3.0 kg/fed.
- □ Lower than normal seed rate will help to reduce lodging and harvest.
- □ Seed rate above 3.0 kg/fed will result in tall spindly plants prone to lodging.
- □ Increased seed rate suppresses weed infestation. It has been observed that dense crop stand discourages too many branching and crop matures more uniformly which facilitate combining.
- Plants will thinned to two plants per hill after month from sown at 3-4 leaves.

Sowing Method and Spacing

a. **Broadcast method:** Since the seeds of rapeseed or canola are small in size therefore growers find broadcasting method of sowing very convenient. They spread the seed over the field as even as possible and plough or harrow and then plank the field. This method is not generally recommended.

b. **Sowing on ridges method:** Seeds are sown on ridges, 50-60 cm row width. The recommended spacing between hills 10-15 cm among plants and 2-3 cm seed depth.

Varieties

- Imported cultivars from European Union such: Pactol and Orpal.
- Agriculture research center selected the Egyptian cultivars of Serw 4 and Serw 6.

Weed Control

- Canola seedlings are very susceptible to weed competition in the first few weeks after emergence. An effective weed control during this period is vital. The crop canopy usually closes 6 to 8 weeks after emergence and then canola becomes an excellent weed competitor due to increased canopy. In Egypt hand hoeing twice before the first and second irrigation or Glyphosate (Roundup) is pre-emergence herbicide can be used to control weeds.

Irrigation

- Irrigation frequency varies with environmental conditions, temperature, rainfall, soil type, and variety. In flooding generally rapeseed requires 4 – 5 irrigations depending upon rains. Moisture stress during flowering, pod formation and seed development stages affects the yield.
- Maximum oil accumulation occurs during the pod stage until pod maturation. Irrigation during this stage will maximise oil content.

Fertilization

- Organic manure at rate of 15-20 m3/fed was addwd during soil preperation.
- The phosphorus requirements for good yields of canola is equal to or greater than those for wheat or barley. Rapeseed takes phosphorus from the soil rapidly in the early growth stages. So 150-200 kg/fed in the form of calcium super phosphate (15.5 P2O5) and 50 kg/fed from potassium sulphate (48 % K2o) must be added during seed bed preparation or after thinning.
- Crop responses to fertilizer nitrogen are influenced by soil type, moisture conditions and nutrient balance. High rates should only be applied when a soil test indicates they are needed. Nitrogenous fertilizers are used in split doses i.e. Basal dose of 45 kg N/fed will added in three equial portions, the first bore planting, the second after thinning and third one with beging of flowering.

Microelement fertilization

- In new reclaimed soils, foliar application of microelements from Fe, Mn, Zn, Cu (1:2:2:4), respectively at rate of 0.5 g/L twice at age of 45 days from sown and the second one after two weeks from the first.

HARVESTING

- The crop matures in 110-190 days depends upon the variety and time of sowing. The pods become yellowish brown and seed moisture is less than 15% (when 60 – 70% pods turn yellow). Seed sound is produced from the pods, when shaken. Harvesting is a critical operation, its optimum harvesting time is very important because early harvesting can reduce seed quality and late harvesting can enhance pod shattering. Crop should be harvested early in the morning. When the plants are moist, otherwise yield losses occur due to shattering.

Seed Yield

- A good crop can produce about 1000-1500 kg/fed of seed depending upon the variety, sowing dates and agronomic practices applied is expected from rapeseed and canola.


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