

# Honey plants p.1; p.2

# Crop plants

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Crop plants

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Buckwheat

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Rapeseed

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White clover

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Alsike clover

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Common bird's-foot trefoil

Fabaceae

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Common sainfoin

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Alfalfa

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Honey clover

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Serradella

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Vetch

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Broad bean

# Buckwheat (*Fagopyrum esculentum* Moench)

Gryka



- ▶ A flowering plant in the family *Polygonaceae* cultivated for its grain-like seeds and as a cover crop.
- ▶ The name "buckwheat" is used for several other species, such as *Fagopyrum tataricum*, a domesticated food plant raised in Asia.



- ▶ Buckwheat is a herbaceous annual flowering plant,
- ▶ Height 60 cm,
- ▶ Flowers - red stems and pink and white,
- ▶ Leaves - arrow-shaped,
- ▶ Fruits - achenes about 5–7 mm with 3 prominent sharp angles.

# Buckwheat

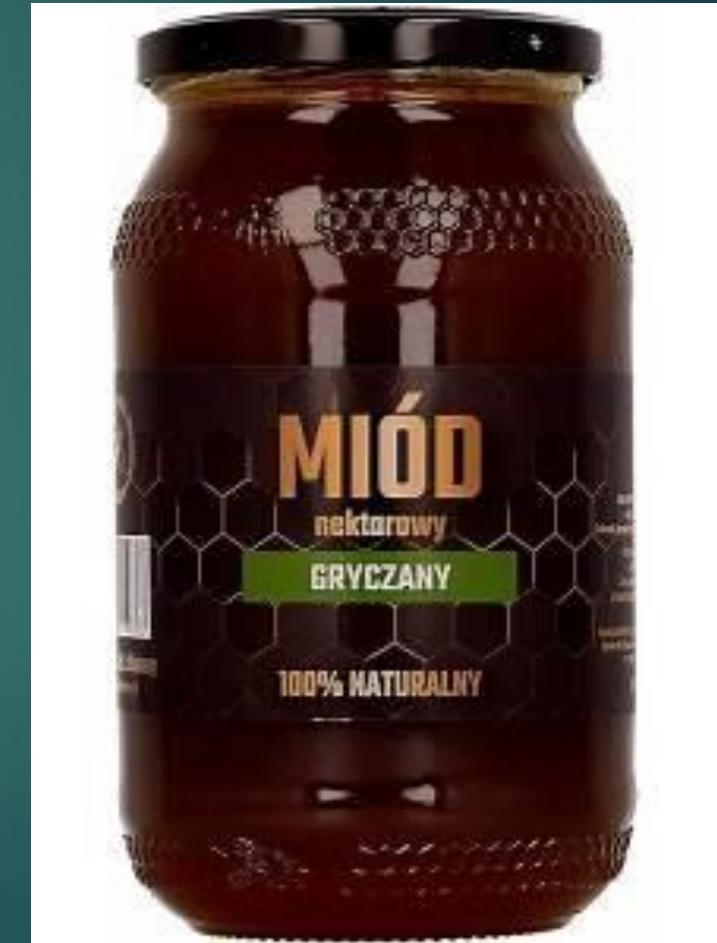
- ▶ Short-season crop that grows well in low-fertility or acidic soils;
- ▶ Too much fertilizer – especially nitrogen – reduces yields, and the soil must be well drained.
- ▶ In hot climates buckwheat can be grown only by sowing late in the season, so that it blooms in cooler weather.



- ▶ Buckwheat is an important honey plant.
- ▶ Cool moist conditions optimize nectar production, and dry, hot conditions lead to a lower range of nectar being collected.
- ▶ Buckwheat produces nectar from morning to midday.



- The presence of pollinators greatly increases yield.
- Nectar from flowering buckwheat produces a dark-colored honey.



# Buckwheat

<b>Stand</b>	sunny
<b>Soil</b>	sandy, sandy-clay, light, moist
<b>Flowering time</b>	VII-VIII
<b>Flowering length</b>	5-7 weeks
<b>Breeding</b>	seeds
<b>Honey yield</b>	70-500 kg/ha
<b>Pollen yield</b>	60-400 kg/ha



# Cultivation

- ▶ Time of sowing – after 15.V.
- ▶ Temp.  $>10^{\circ}\text{C}$
- ▶ Row spacing - 20-30 cm
- ▶ Sowing rate - 50-75 kg/ha



# Rapeseed (*Brassica napus* subsp. *napus*) Rzepak

- ▶ known as rape or oilseed rape,
- ▶ a bright-yellow flowering,
- ▶ member of the family *Brassicaceae* (mustard or cabbage family),



- cultivated mainly for its oil-rich seed, which naturally contains appreciable amounts of erucic acid,
- the term canola denotes a group of rapeseed cultivars which were bred to have very low levels of erucic acid and are especially prized for use as human and animal food,
- the third-largest source of vegetable oil and the second-largest source of protein meal in the world.



- *Brassica napus* grows to 100 cm in height with hairless, fleshy, pinnatifid and glaucous lower leaves which are stalked whereas the upper leaves have no petioles.



# Flowers - rapeseed

- ▶ bright yellow and about 17 mm across,
- ▶ radial and consist of four petals in a typical cross-form, alternating with four sepals,
- ▶ indeterminate racemose flowering starting at the lowest bud and growing upward in the following days,
- ▶ two lateral stamens with short filaments, and four median stamens with longer filaments whose anthers split away from the flower's center upon flowering.



## Pods:

- ▶ pods are green and elongated siliquae during development that eventually ripen to brown.
- ▶ grow on pedicels 1 to 3 cm long, and can range from 5 to 10 cm in length.
- ▶ two compartments separated by an inner central wall within which a row of seeds develops.
- ▶ The seeds are round and have a diameter of 1.5 to 3 mm

## Seeds:

- ▶ a reticulate surface texture
- ▶ black and hard at maturity



- ▶ Rapeseed has a high melliferous potential (produces substances that can be collected by insects) and is a main forage crop for honeybees.
- ▶ Monofloral rapeseed honey has a whitish or milky yellow color, peppery taste and, due to its fast crystallization time, a soft-solid texture.



# Rapeseed

<b>Stand</b>	sunny
<b>Soil</b>	sandy, sandy-clay, light, moist
<b>Flowering time</b>	VII-VIII
<b>Flowering length</b>	3 weeks
<b>Breeding</b>	seeds
<b>Honey yield</b>	80-300 kg/ha
<b>Pollen yield</b>	100-150 kg/ha



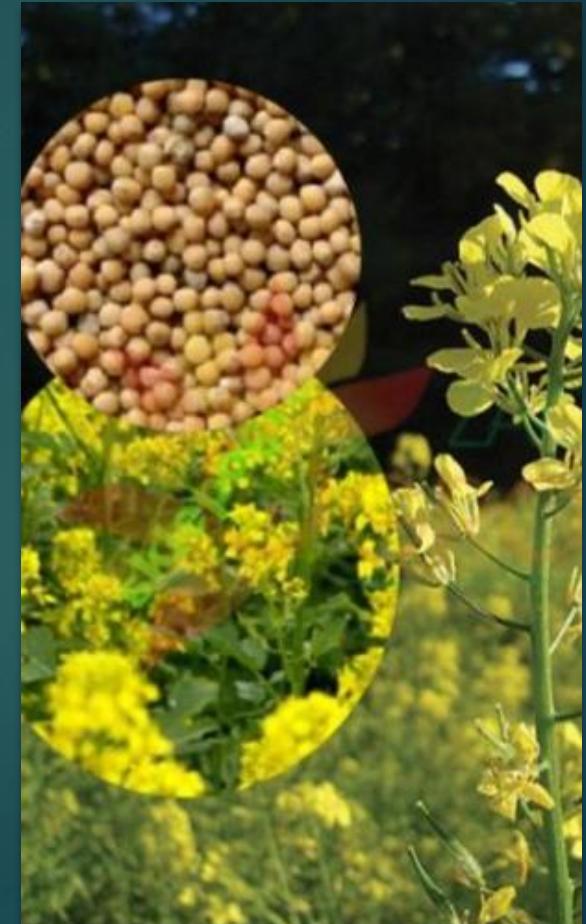
# White mustard (*Sinapis alba L.*)

## Gorczyca biała

- ▶ an annual plant
- ▶ the family *Brassicaceae*
- ▶ grown for seeds

Used to make:

- ▶ the condiment mustard,
- ▶ as fodder crop,
- ▶ as a green manure.



# White mustard

- ▶ branching plant with alternate irregularly lobed leaves

Flowers:

- ▶ The yellow four-petaled flowers have a fragrance similar to honey

Pods:

- ▶ large bristly
- ▶ swollen around the seeds and taper to a point
- ▶ contains up to eight seeds, which are often called “mustard grains.”

Seeds:

- light yellow seeds



# Use:

- ▶ as a condiment,
- ▶ the plant is also grown as a green manure,
- ▶ fodder crop,
- ▶ young seedlings can be eaten fresh as sprouts.



# Cultivation

- ▶ grown as a spring-sown crop;
- ▶ the dry seeds are harvested in early autumn.
- ▶ The plants grow rapidly and enter a phase of dense flowering in early summer, reaching their full height of 1.5 to 2 metres as their flowers fade and the fruits appear.
- ▶ White mustard can flourish on many different types of soil, suffers from few insect pests or plant diseases, and can tolerate extremes of weather without serious harm.



# White mustard

<b>Stand</b>	Sunny, partial shade
<b>Soil</b>	loamy, sandy, sufficiently moist, with a neutral pH
<b>Flowering time</b>	VI-VII
<b>Flowering length</b>	3-4 weeks
<b>Breeding</b>	seeds
<b>Honey yield</b>	30-100 kg/ha
<b>Pollen yield</b>	80-200 kg/ha



# Camelina (*Camelina sativa* L.)

Lnianka

- ▶ family Brassicaceae
- ▶ known in English as camelina, gold-of-pleasure, or false flax, also occasionally wild flax, linseed dodder, German sesame, and Siberian oilseed.
- ▶ It is native to Europe and to Central Asian areas.
- ▶ This plant is cultivated as an oilseed crop mainly in Europe and in North America.



# Camelina

- ▶ summer or winter annual plant,
- ▶ Grows to heights of 30–120 cm with branching stems which become woody at maturity.
- ▶ The leaves are alternate on the stem, lanceolate with a length from 2–8 cm and a width of 2–10 mm.
- ▶ Leaves and stems may be partially hairy.
- ▶ It blooms between June and July.
- ▶ Its abundant, four-petaled flowers are pale yellow in colour, and cross-shaped.
- ▶ Fruit is pear shaped with a short beak.
- ▶ The seeds are brown.
- ▶ The 1,000-seed weight ranges from 0.8–2.0 g.



# Arugula (*Eruca vesicaria* L.)

Rokietta (rukiew) siewna

- ▶ Arugula (American English) or rocket (Commonwealth English)
- ▶ (*Eruca vesicaria*; syns. *Eruca sativa* Mill., *E. vesicaria* subsp. *sativa* (Miller) Thell., *Brassica eruca* L.)
- ▶ is an edible annual plant
- ▶ family Brassicaceae
- ▶ used as a leaf vegetable for its fresh, tart, bitter, and peppery flavor.

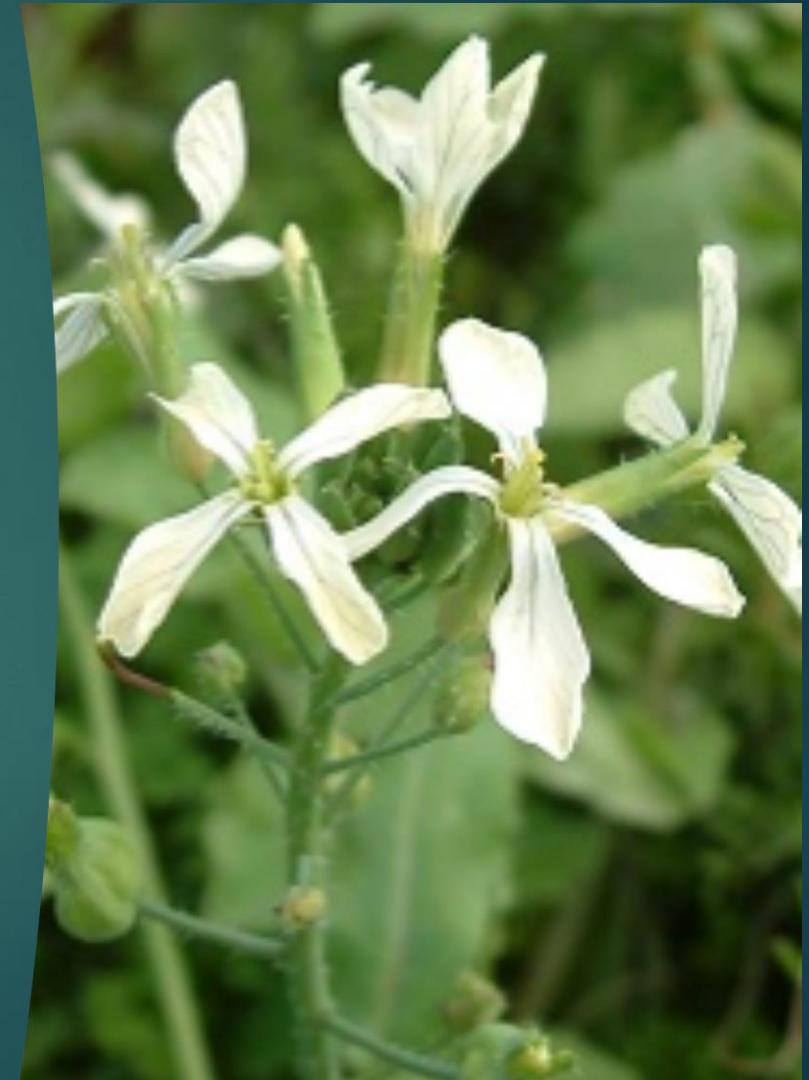


- ▶ plant growing to 20 to 100 centimetres
- ▶ The pinnate leaves are deeply lobed with four to ten small lateral lobes and a large terminal lobe.
- ▶ The flowers are 2 to 4 cm in diameter, arranged in a corymb, with the typical Brassicaceae flower structure.
- ▶ The petals are creamy white with purple veins, and the stamens are yellow.
- ▶ The fruit is a siliqua (pod) 12 to 25 mm long with an apical beak, containing several seeds.



# Arugula

<b>Stand</b>	Sunny
<b>Soil</b>	loamy, sandy, sufficiently moist, with a neutral pH
<b>Flowering time</b>	VI-VII
<b>Flowering length</b>	3-4 weeks
<b>Breeding</b>	seeds
<b>Honey yield</b>	~110 kg/ha
<b>Pollen yield</b>	-



# Sunflower (*Helianthus annuus* L.)

## Słonecznik zwyczajny

- ▶ family Compositae
- ▶ It is commonly grown as a crop for its edible oily seeds.
- ▶ Apart from cooking oil production, it is also used as livestock forage (as a meal or a silage plant), as bird food, in some industrial applications, and as an ornamental in domestic gardens.



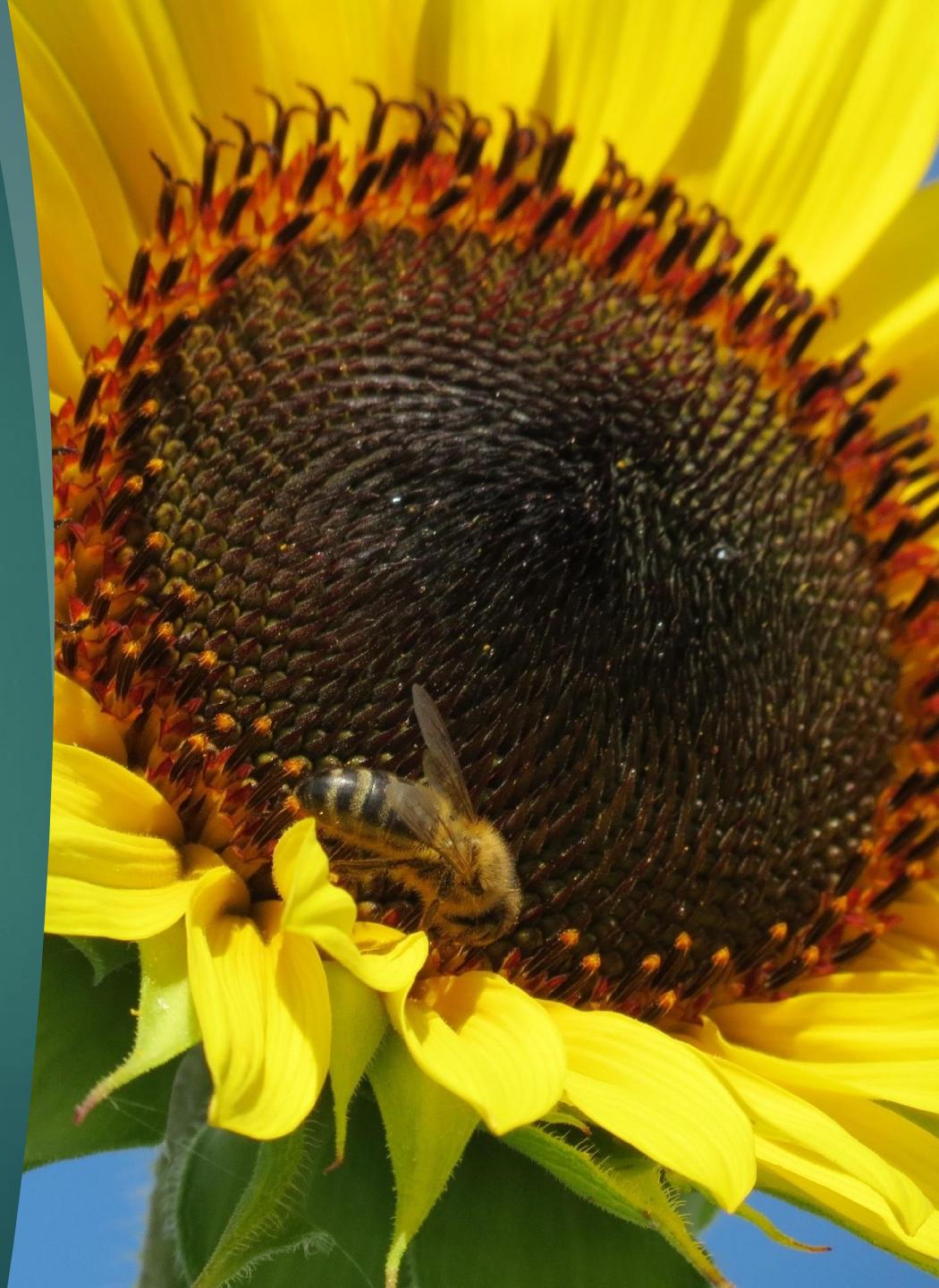
# Sunflower

- ▶ The plant has an erect rough-hairy stem, reaching typical heights of 3 metres
- ▶ leaves are broad, coarsely toothed, rough and mostly alternate;
- ▶ leaves near the bottom are largest and commonly heart-shaped



# Flowers

- ▶ The plant flowers in summer.
- ▶ What is often called the "flower" of the sunflower is actually a "flower head" (pseudanthium), 7.5–12.5 cm wide, of numerous small individual five-petaled flowers ("florets").
- ▶ The outer flowers, which resemble petals, are called ray flowers.
- ▶ Each "petal" consists of a ligule composed of fused petals of an asymmetrical ray flower.



- ▶ Flowers are sexually sterile and may be yellow, red, orange, or other colors.
- ▶ The spirally arranged flowers in the center of the head are called disk flowers.
- ▶ These mature into fruit (sunflower "seeds").



# Sunflower

- ▶ Sunflower honey is a sweet fluid that is made from the nectar of sunflowers.
- ▶ It is mild in flavor, and its color is a medium shade of yellow.
- ▶ At room temperature, this type of honey is a highly viscous, crystalline fluid.



# Sunflower

<b>Stand</b>	sunny,
<b>Soil</b>	fertile
<b>Flowering time</b>	VII-VIII
<b>Flowering length</b>	3-4 weeks
<b>Breeding</b>	seeds
<b>Honey yield</b>	40-50 kg/ha
<b>Pollen yield</b>	35-65 kg/ha



# Red clover

(*Trifolium pratense* L.)

Koniczyna czerwona/łąkowa

- ▶ Family – Fabaceae
- ▶ is a herbaceous,
- ▶ short-lived perennial plant,
- ▶ variable in size,
- ▶ growing to 20–80 cm tall.
- ▶ It has a deep taproot which makes it tolerant to drought and gives it a good soil structuring effect.



# Red clover

- ▶ The leaves are alternate, trifoliate (with three leaflets), each leaflet 15–30 mm long and 8–15 mm broad, green with a characteristic pale crescent in the outer half of the leaf;
- ▶ the petiole is 1–4 cm long, with two basal stipules that are abruptly narrowed to a bristle-like point.
- ▶ The flowers are dark pink with a paler base, 12–15 mm long, produced in a dense inflorescence, and are mostly visited by bumblebees.



# Red clover

<b>Occurance</b>	meadow, thickets, roadsides
<b>Stand</b>	sunny,
<b>Soil</b>	well-drained loamy soils
<b>Flowering time</b>	V-IX
<b>Flowering length</b>	5 weeks
<b>Breeding</b>	seeds
<b>Honey yield</b>	40-100 (200) kg/ha
<b>Pollen yield</b>	20-40 kg/ha



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# White clover

(*Trifolium repens* L.)

Koniczyna biała

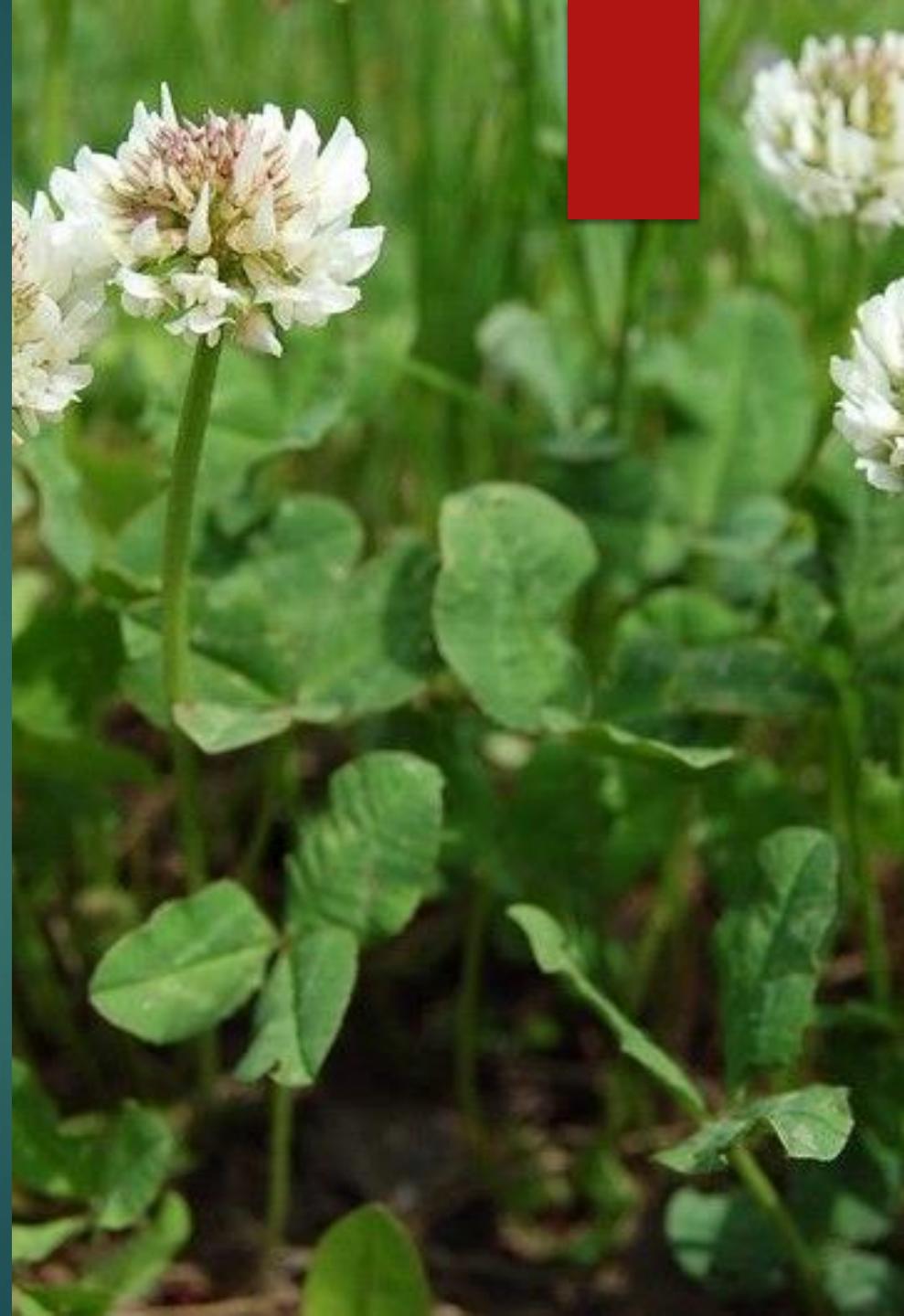
- ▶ *Trifolium repens*, the white clover,
- ▶ is a herbaceous perennial plant in the bean family Fabaceae
- ▶ It has been widely introduced worldwide as a forage crop, and is now also common in most grassy areas (lawns and gardens)



- ▶ It is a herbaceous, perennial plant.
- ▶ It is low growing, with heads of whitish flowers, often with a tinge of pink or cream that may come on with the aging of the plant.
- ▶ The heads are generally 1.5–2 cm wide, and are at the end of 7 cm peduncles or inflorescence stalks.
- ▶ The flowers are mostly visited by bumblebees and often by honey bees.



- ▶ The leaves are trifoliate, smooth, elliptic to egg-shaped and long-petioled and usually with light or dark markings.
- ▶ The stems function as stolons, so white clover often forms mats, with the stems creeping as much as 18 cm (7 in) a year, and rooting at the nodes.
- ▶ The leaves form the symbol known as shamrock.
- ▶ Almost always, a white clover will be trifoliate.
- ▶ However, one can, but only sometimes, possess four or more leaflets.



# White clover

<b>Occurance</b>	<b>meadow, thickets, roadsides</b>
<b>Stand</b>	sunny,
<b>Soil</b>	well-drained loamy soils
<b>Flowering time</b>	V-IX
<b>Flowering length</b>	5 -6 weeks
<b>Breeding</b>	seeds
<b>Honey yield</b>	60-100 kg/ha
<b>Pollen yield</b>	25-35 kg/ha



# Alsike clover, *Trifolium hybridum* L. Koniczyna białoróżowa

- ▶ family Fabaceae
- ▶ The stalked, pale pink or whitish flower head grows from the leaf axils, and the trifoliate leaves are unmarked.
- ▶ The plant is up to 40 cm tall,
- ▶ found in fields and on roadsides – it is also grown as fodder (hay or silage).
- ▶ The plant blooms from spring to autumn.



# Alsike clover

- ▶ is a perennial plant with a semi-erect, sparsely branched, grooved stem, hairy in its upper regions.
- ▶ The leaves are alternate and stalked with small stipules.
- ▶ The leaves have three blunt-tipped ovate, unspotted leaflets with finely toothed margins.
- ▶ The inflorescence has a long stalk and is densely globose.



# Alsike clover

- ▶ The individual florets have a five-lobed calyx and an irregular corolla consisting of five pink petals, one upstanding "standard", two lateral "wings" and the lower two fused to form a "keel".
- ▶ There are ten stamens and a single carpal.



# Alsike/Swedish clover

Occurance	meadows
Stand	sunny, shadow
Soil	well-drained loamy soils
Flowering time	V-IX
Flowering length	4-5 weeks
Breeding	seeds
Honey yield	100-130 kg/ha
Pollen yield	8-24 kg/ha



# Common bird's-foot trefoil

*Lotus corniculatus* L.

## Komonica

- ▶ Family *Fabaceae*,
- ▶ Common names include common bird's-foot trefoil, eggs and bacon, birdsfoot deervetch, and just bird's-foot trefoil,
- ▶ It is a perennial herbaceous plant, similar in appearance to some clovers.
- ▶ The name 'bird's foot' refers to the appearance of the seed pods on their stalk.



- ▶ The height of the plant is variable, from 5 to 20 cm occasionally more where supported by other plants;
- ▶ the stems can reach up to 50 cm (20 in) long.
- ▶ It is typically sprawling at the height of the surrounding grassland.
- ▶ It can survive fairly close grazing, trampling, and mowing.
- ▶ It is most often found in sandy soils.
- ▶ The flowers develop into small pea-like pods or legumes.



- ▶ The flowers are mostly visited by bumblebees.
- ▶ The plant is an important nectar source for many insects and is also used as a larval food plant by many species of Lepidoptera such as six-spot burnet and the silver-studded blue.
- ▶ It is a host plant for the wood white butterfly, *Leptidea sinapis*.



# Common bird's-foot trefoil

<b>Occurance</b>	meadows
<b>Stand</b>	sunny,
<b>Soil</b>	sandy loam
<b>Flowering time</b>	V-IX
<b>Flowering length</b>	~4 weeks
<b>Breeding</b>	seeds
<b>Honey yield</b>	25-60 kg/ha
<b>Pollen yield</b>	20-45 kg/ha



# Common sainfoin

(*Onobrychis viciifolia* Scop.)

## Esparceta siewna

- ▶ Perennial legume
- ▶ Tall hollow stems, 60-80 cm or more.
- ▶ Its leaves are compound with 5-14 pairs of oval-shaped leaflets and a single leaflet at the tip.
- ▶ Sainfoin has conelike clusters fragrant, pinkish-red flowers on the end of long stalks.
- ▶ Seed pods are flat and contain a single dark olive green, brown, or black seed, 4-6 mm.

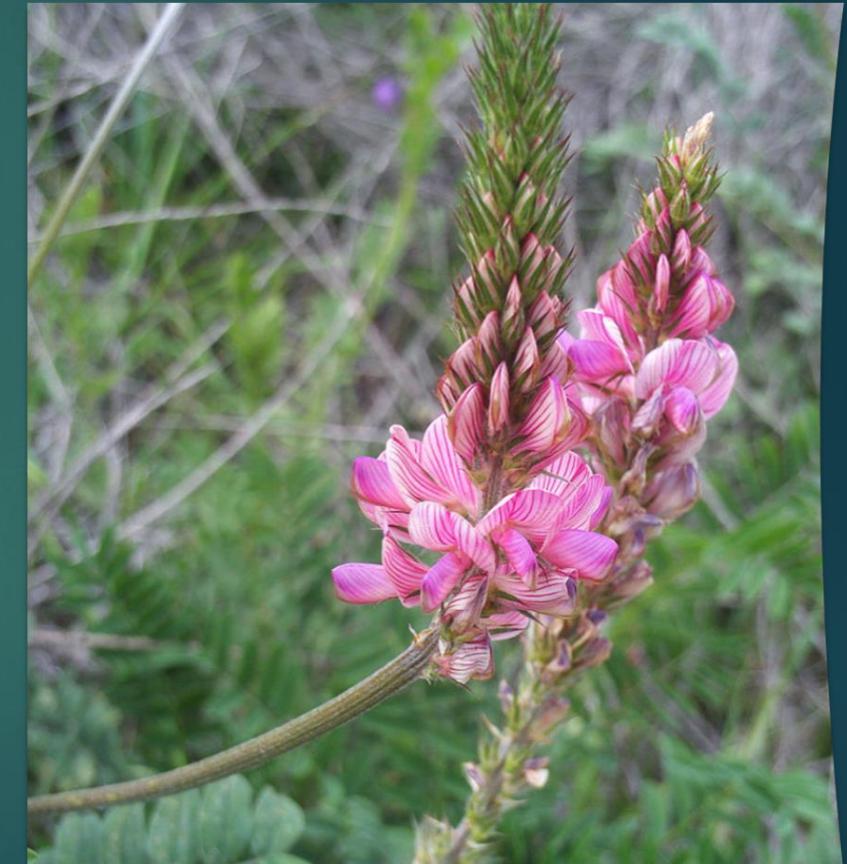


- ▶ Sainfoin is nonbloating, and it is a preferred forage for cattle, sheep, deer and elk.
- ▶ They will concentrate their feeding on sainfoin even when other forages are readily available.
- ▶ Honey bees readily visit the pink flowers and sainfoin honey is of excellent quality.
- ▶ Sainfoin seed pods shatter in early fall and the nutritious seed is consumed by birds and rodents.



# Common sainfoin

Stand	sunny
Soil	dry
Flowering time	V-VII
Flowering length	2-4 weeks
Breeding	seeds
Honey yield	60-180 kg/ha
Pollen yield	50-70 kg/ha



# Alfalfa (*Medicago sativa* L.), Lucerna siewna

- ▶ called also lucerne,
- ▶ is a perennial flowering plant in the legume family Fabaceae.
- ▶ It is cultivated as an important forage crop in many countries around the world.
- ▶ It is used for grazing, hay, and silage, as well as a green manure and cover crop.
- ▶ The name alfalfa is used in North America.
- ▶ The name lucerne is the more commonly used name in the United Kingdom, South Africa, Australia, and New Zealand.



Pl. 75. Luzerne cultivée. *Medicago sativa* L.

# Alfalfa

- ▶ The plant superficially resembles clover (a cousin in the same family), especially while young, when trifoliate leaves comprising round leaflets predominate.
- ▶ Later in maturity, leaflets are elongated.
- ▶ It has clusters of small purple flowers followed by fruits spiralled in 2 to 3 turns containing 10–20 seeds.
- ▶ Alfalfa is native to warmer temperate climates.
- ▶ It has been cultivated as livestock fodder since at least the era of the ancient Greeks and Romans.



# Alfalfa

- ▶ a perennial forage legume which normally lives four to eight years, but can live more than 20 years, depending on variety and climate.
- ▶ The plant grows to a height of up to 1 metre and has a deep root system, sometimes growing to a depth of more than 15 m to reach groundwater.
- ▶ Typically the root system grows to a depth of 2–3 m depending on subsoil constraints.
- ▶ Owing to this deep root system, it helps to improve soil nitrogen fertility and protect from soil erosion.
- ▶ This depth of root system, and perenniability of crowns that store carbohydrates as an energy reserve, make it very resilient, especially to droughts.



# Alfalfa

Stand	sunny
Soil	fertile
Flowering time	V-X
Flowering length	4-5 weeks
Breeding	seeds
Honey yield	25-270 kg/ha
Pollen yield	80-320 kg/ha



# Honey clover (*Melilotus albus* L.)

## Nostrzyk biały

- ▶ honey clover, white melilot (UK), Bokhara clover (Australia), white sweetclover (USA), and sweet clover,
- ▶ is a nitrogen-fixing legume in the family Fabaceae.
- ▶ *Melilotus albus* is considered a valuable honey plant and source of nectar and is often grown for forage.
- ▶ Its characteristic sweet odor, intensified by drying, is derived from coumarin.



# Honey clover

- ▶ annual or biennial legume
- ▶ The light green stems are round or slightly terete (furrowed on all sides), glabrous (smooth), and often branched.
- ▶ The alternate leaves are trifoliate and sparsely distributed along the stem and alternate in arrangement.
- ▶ The upper stems terminate in narrow racemes of white flowers that have a tendency to hang downward from the central stalk of the raceme.

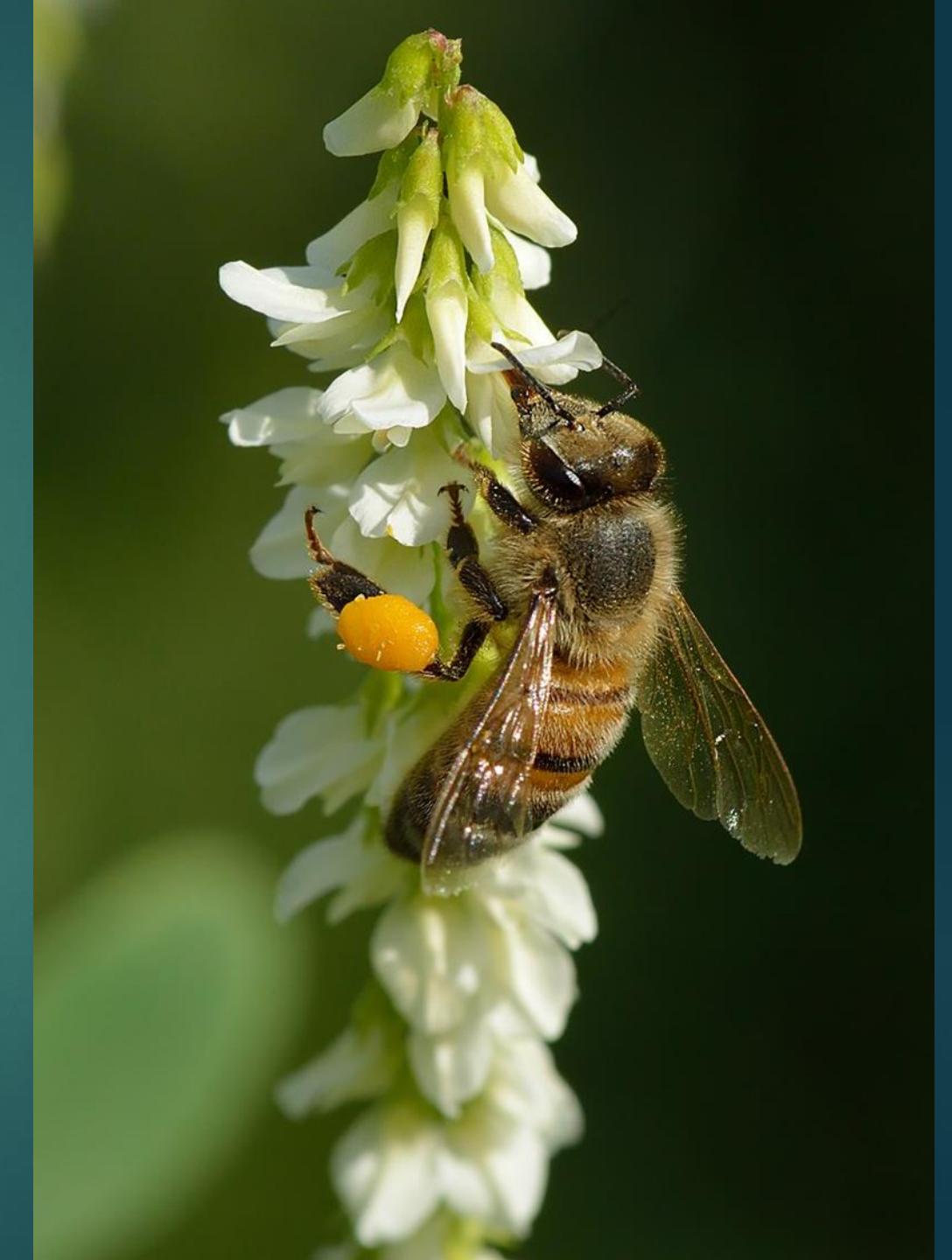


- ▶ Each flower is about 8mm long, consisting of 5 white petals and a light green calyx with 5 teeth.
- ▶ Flowers are small, floppy, tubular at the base and become broader toward the outer edges and wing and keel petals are about equal in length.
- ▶ The ovoid seedpods are black to dark grey, smooth or slightly reticulated and about 3-4mm.
- ▶ Each pod usually contains one, but sometimes two, yellow seeds that are ovate to kidney-shaped.
- ▶ Plants generally flower and die during the second year of growth.
- ▶ The blossoming period occurs from early summer to fall, reaching its peak during mid-summer, and lasts for about 1–2 months for a colony of plants.



# Honey clover

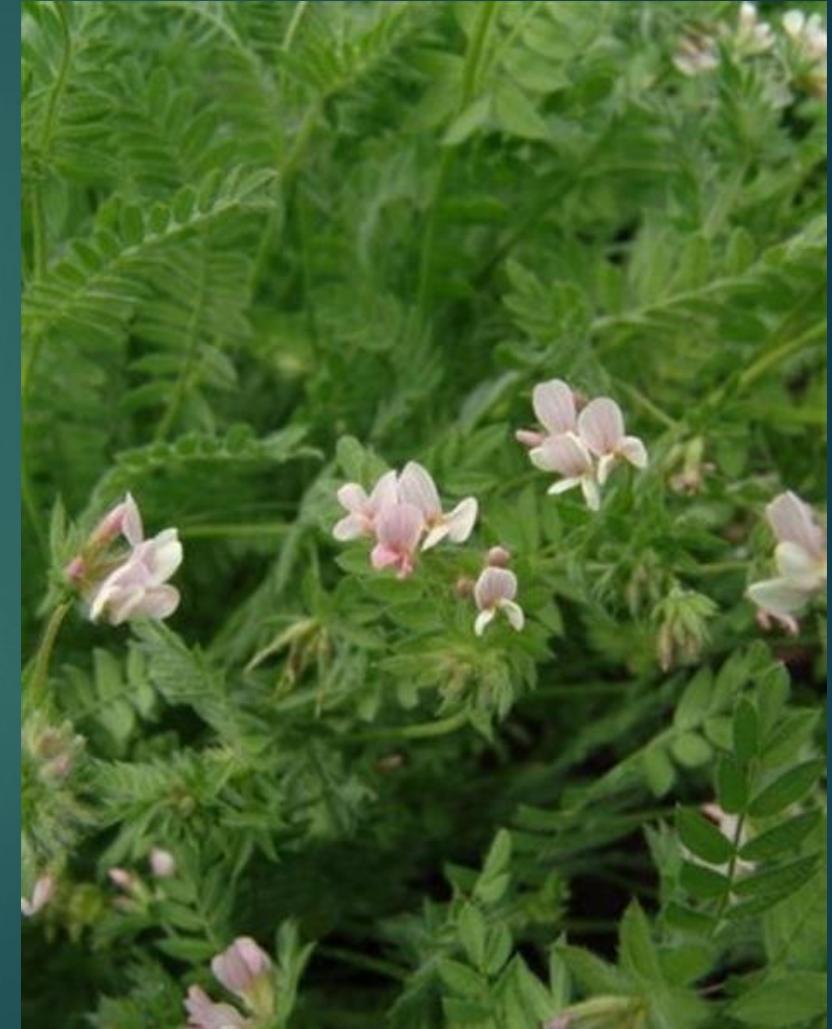
Stand	sunny
Soil	dry
Flowering time	VI-X
Flowering length	> 4 weeks
Breeding	seeds
Honey yield	150-160 kg/ha (annual) 220-800 kg/ha (biennial)
Pollen yield	10-90 kg/ha (annual) 40-170 kg/ha (biennial)



# Seradella (*Ornithopus sativus* L.)

Seradela pastewna

- ▶ the serradella or common birdsfoot,
- ▶ is a species of flowering plant in the family Fabaceae.



# Seradella

Stand	sunny
Soil	light, sandy soil
Flowering time	VII-VIII
Flowering length	9-10 weeks
Breeding	seeds
Honey yield	~20 kg/ha
Pollen yield	-



# Common vetch (*Vicia sativa*)

## Wyka siewna

- ▶ known as the common vetch, garden vetch, tare or simply vetch,
- ▶ is a nitrogen-fixing leguminous plant in the family *Fabaceae*.
- ▶ It is likely native to North Africa, Western Asia and Europe, but is now naturalized in temperate and subtropical regions worldwide.
- ▶ Although considered a weed when found growing in a cultivated grainfield, this hardy plant is often grown as a green manure, livestock fodder or rotation crop.



- ▶ Stems - with hollow, four-sided, hairless to sparsely hairy
- ▶ The leaves are stipulate, alternate and compound, each made up of 3–8 opposite pairs of linear, lance-shaped, oblong, or wedge-shaped, needle-tipped leaflets up to 35 millimeters.
- ▶ Each compound leaf ends in a branched tendril.



- ▶ The pea-like flowers occur in the leaf axils, solitary or in pairs.
- ▶ The flower corolla is 1–3 cm long and bright pink-purple in colour, more rarely whitish or yellow. The flowers are mostly visited by bumblebees.
- ▶ The fruit is a legume pod up to 6 or 7 centimeters long, which is hairy when new, smooth later, then brown or black when ripe.
- ▶ It contains 4–12 seeds.



# Common vetch

Stand	sunny
Soil	
Flowering time	VII-IX
Flowering length	~6 weeks
Breeding	seeds
Honey yield	180-350 kg/ha
Pollen yield	-



# Broad bean (*Vicia faba* L.) Bobik

- ▶ commonly known as the broad bean, fava bean, or faba bean,
- ▶ is a species of vetch, a flowering plant in the pea and bean family Fabaceae.
- ▶ It is widely cultivated as a crop for human consumption, and as a cover crop.



- ▶ stiffly erect, annual plant,
- ▶ with two to four stems that are square in cross-section.
- ▶ The leaves are 10 to 25 cm long, pinnate with 2–7 leaflets, and glaucous (grey-green).
- ▶ Unlike most other vetches, the leaves do not have tendrils for climbing over other vegetation.



- ▶ The flowers are 1 to 2.5 cm long with five petals;
- ▶ the standard petals are white, the wing petals are white with a black spot (true black, not deep purple or blue as is the case in many "black" colorings)and the keel petals are white.
- ▶ Crimson-flowered broad beans also exist, which were recently saved from extinction.
- ▶ The flowers have a strong sweet scent which is attractive to bees and other pollinators.



- ▶ The fruit is a broad, leathery pod that is green, but matures to a dark blackish-brown, with a densely downy surface;
- ▶ Each bean pod contains 3–8 seeds.
- ▶ They are round to oval and have a 5–10 mm diameter in the wild plant, but are usually flattened and up to 20–25 mm long, 15 mm broad and 5–10 mm thick in food cultivars.



# Broad bean

Stand	sunny
Soil	
Flowering time	V-VI
Flowering length	2-3 weeks
Breeding	seeds
Honey yield	25-60 kg/ha
Pollen yield	0,6 mg/flower





Thank you for your attention!