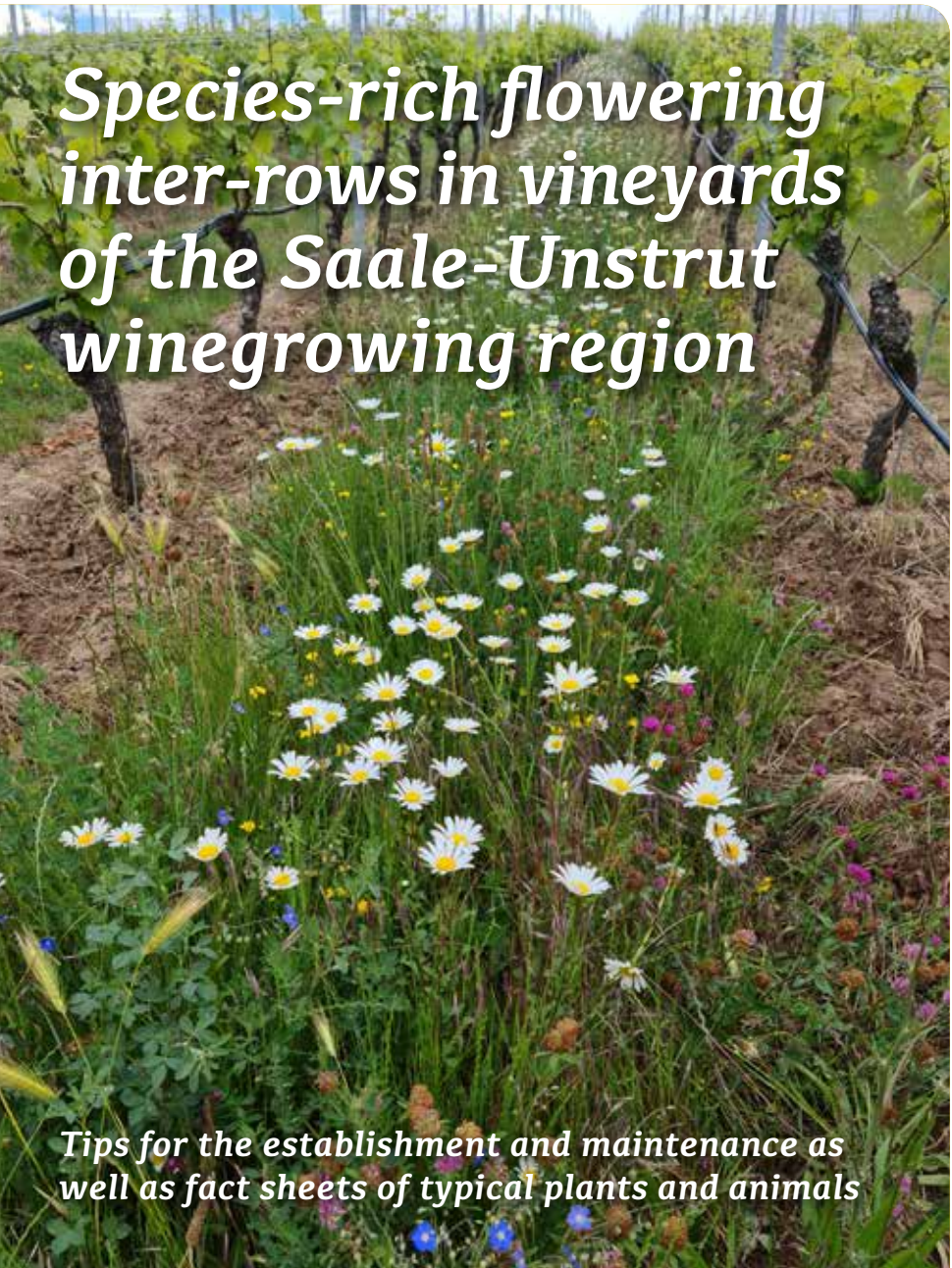
Life Vine Adapt

Species-rich flowering inter-rows in vineyards of the Saale-Unstrut winegrowing region



Tips for the establishment and maintenance as well as fact sheets of typical plants and animals

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SACHSEN-ANHALT

Impressum

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Cover picture

Vineyard inter-row sown with wild plants on the Kreisberg in Höhnstedt, May 2022 – © Daniel Elias

Disclaimer

This brochure was produced as part of the international project „LIFE VineAdapt - Sustainable viticulture for adaptation to climate change". The responsibility for the content of this publication lies solely with the authors. The European Commission is not responsible for any use that may be made of the information contained therein.

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www.life-vineadapt.eu

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Contents

Photo: Daniel Elias

Foreword

Why this brochure

Despite its northern location, viticulture has been practiced in the Saale-Unstrut wine-growing region for more than 1,000 years. The area under cultivation here currently covers almost 850 hectares.

The climate is continental in tone. With annual precipitation of just over 500 mm per year, the area is one of the driest regions in Germany. Many of the vineyards here are located on south or southwest-facing, shallow slopes with a high potential for biodiversity. Nature reserves with species-rich dry grasslands or near-natural shrub and forest biotopes often border the vineyards. However, due to intensive cultivation, especially the high degree of mechanization and the use of pesticides, these do little preserve biodiversity and connect the landscape. The challenges posed by climate change are also already clearly visible in the Saale-Unstrut wine-growing region. Phenological shifts, such as the earlier flowering of vines, make them susceptible to late frosts. Weather extremes such as hot and dry periods in spring and summer will occur more frequently.

When it rains in the summer months, it is increasingly in the form of heavy rainfall, which increases the risk of erosion in the vineyards. The occurrence of pests is also expected to increase. Against this background, new vineyard management techniques need to be introduced and put into practice.

Until now, vineyard inter-rows have often been cultivated very intensively to keep them completely free of plants or at least free of taller vegetation in order minimize competition for water and nutrients with the vines. In contrast, grassed vineyard inter-rows can reduce the risk of soil erosion during heavy rainfall events and as wheel track for machinery during vineyard work. A common practice in the Saale-Unstrut wine-growing region is therefore to green only every second inter-row. However, commercial seed mixtures are often used to plant these inter-rows. These seed mixtures often contain only a few grass species and cultivated varieties of wild forbs. Species-poor grass-clover mixtures are very often used.

Some of these commercial seeding mixtures contain also non-native species such as phacelia or incarnate clover. Such commercial seed mixtures are often characterized by low establishment rates and only provide a food source for a few insect species. In order to ensure optimal adaptation to the specific vineyard sites and also to promote a broader spectrum of pollinating and beneficial insects, only native wild plants adapted to the site should used. Various of such seeding mixtures were developed and tested as part of the **LIFE VineAdapt project**.

With this brochure, we would like to share the knowledge we have gained with you. We would like to introduce you to the LIFE VineAdapt project and the „Biodiverse Winegrowing" label, which can be used by winegrowers to draw attention to their sustainable wine production.

Here you will find tips for establishing and maintaining species-rich flowering inter-rows in the vineyard. We also present our recommended species list for sowing. You will also find species portraits of 25 plant species sown in the Saale-Unstrut region, some of which are also suitable for other wine-growing regions. This brochure also provides an overview of typical wild bees and important beneficial arthropods in the vineyard that are supported by sowing native wild forbs.

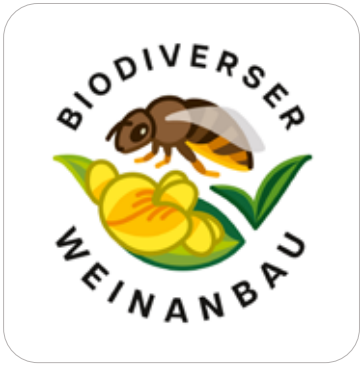
Photo: Daniel Elias

The LIFE VineAdapt project

The project aims to help improve the resilience of vineyard ecosystems to climatic changes. Increasing biodiversity and adapting the management of vineyards are key to this. Eight research and practice partners from Germany, France, Austria and Hungary are working together in the project to optimize vineyard management practices that conserve resources and are adapted to climate change. Further information on the project can be found here: www.life-vineadapt.eu.

Label „Biodiverse Winegrowing“

The **LIFE VineAdapt project** the „Biodiverse Winegrowing“ label, a symbol for more sustainable and biodiversity-friendly wine production. Winegrowers who sow the recommended certified and regionally adapted wild plant mixtures in the vineyard inter-rows can use the label.



The biodiversity vineyards established in this way offer:

- Space for native wild plants
- Habitat for beneficial insects
- Improved erosion prevention
- Liveable countryside

The label provides guidance when buying wines and creates transparency. It can be used on bottle tags or in the internet. By purchasing wines with this label, you are supporting climate and biodiversity-friendly winegrowing. If you are a winegrower and would like to use the (cost-free) label, please contact Dietrich Frank at the Landesweingut Kloster Pforta (E-Mail: **frank@kloster-pforta.de**).

Fotomontage: LKP/Wiesner/Rothkötter

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Species list for the Saale-Unstrut region

Various seeding mixtures were tested as part of the project. The findings from the previous **LIFE VineEcoS project** were also used. The selection of species for the seed mixture was a time-consuming process in collaboration with local experts and seed companies. In addition to a very species- and forb-rich basic mixture for the central reservation of the vineyard inter-row, a mixture with more traffic-tolerant species and a higher proportion of grasses was also developed for the wheel tracks.

Important selection criteria for plant species were

- Occurrence in the natural area of the sown vineyards
- Availability from certified, regional seed propagation of wild plants
- Different lifespans (annual, biennial and perennial)
- High drought tolerance, small size
- Characteristic for habitat types of dry and fresh habitats (habitat types 6110, 6210, 6240, 6510)
- different flower color/shape and flowering periods
- High nectar and pollen supply
- Moderate costs

38 plant species and 19 plant families were selected for the middle section basic mixture (37 forbs, 1 grass). These include 34 perennial plant species. The seed mixture for the wheel tracks contains eight perennial species (6 forbs, 2 grasses).

Middle section seed mixture

Scientific species name	Species name	Plant family	Lifespan	Flowering months	Flower color	Nek	Pol
Achillea millefolium	Common yarrow	Asteraceae	perennial	6-10	white	1	2
Anthemis tinctoria	Dyer's chamomile	Asteraceae	perennial	6-9	yellow	2	2
Anthericum liliago	St Bernard's lily	Asparagaceae	perennial	5-6	white	3	3
Anthyllis vulneraria s. l.	Kidney vetch	Fabaceae	perennial	5-8	yellow	2	2
Campanula rotundifolia	Harebell	Campanulaceae	perennial	6-10	violet	2	2
Centaurea jacea s. str.	Meadow knapweed	Asteraceae	perennial	6-11	purple	3	2
Centaurea scabiosa s. str.	Greater knapweed	Asteraceae	perennial	7-8	purple	3	2
Cichorium intybus	Chicory	Asteraceae	perennial	7-10	light blue	3	3
Clinopodium vulgare	Wild basil	Lamiaceae	perennial	7-9	purple	2	1
Consolida regalis	Field larkspur	Ranunculaceae	annual	5-8	blue	1	2
Dianthus carthusianorum	Carthusian pink	Caryophyllaceae	perennial	6-9	purple	2	1
Falcaria vulgaris	Sickleweed	Apiaceae	perennial	7-9	white	2	1
Galium verum agg.	Yellow bedstraw	Rubiaceae	perennial	6-9	yellow	1	1
Hypericum perforatum	St. John's wort	Hypericaceae	perennial	7-8	yellow	0	3
Knautia arvensis	Field scabious	Dipsacaceae	perennial	7-8	purple	1	1
Leucanthemum ircutianum	Oxeye daisy	Asteraceae	perennial	6-10	white w/(yellow)	2	1
Linaria vulgaris	Common Toadflax	Scrophulariaceae	perennial	6-10	yellow	2	1
Linum austriacum	Austrian flax	Linaceae	perennial	5-7	light blue	1	1
Lotus corniculatus	Common bird's-foot trefoil	Fabaceae	perennial	6-8	yellow	3	1
Malva moschata	Musk mallow	Malvaceae	perennial	6-10	pink	2	1
Medicago lupulina	Hop clover	Fabaceae	perennial	5-10	yellow	2	2
Onobrychis arenaria	Sand sparrow	Fabaceae	perennial	6-7	pink	4	4
Origanum vulgare	Common dost	Lamiaceae	perennial	7-9	pink	3	2
Papaver rhoeas	Common poppy	Papaveraceae	annual	5-7	red	0	3
Phleum phleoides	Boehmer's cat's-tail	Poaceae	perennial	6-7	yellow-green	k. A.	k. A.
Plantago lanceolata	Narrowleaf plantain	Plantaginaceae	perennial	5-10	green-brown	0	3
Plantago media	Hoary plantain	Plantaginaceae	perennial	5-9	green-brown	0	3
Potentilla argentea	Silver cinquefoil	Rosaceae	perennial	6-10	yellow	1	2
Ranunculus bulbosus	Bulbous buttercup	Ranunculaceae	perennial	5-7	yellow	3	3
Reseda lutea	Yellow mignonette	Resedaceae	biennial	5-9	yellow	2	3
Salvia pratensis	Meadow sage	Lamiaceae	perennial	5-8	violet	3	1
Sanguisorba minor ssp. minor	Small burnet	Rosaceae	perennial	5-8	dark red	2	2
Scabiosa ochroleuca	Yellow scabious	Dipsacaceae	perennial	7-10	light yellow	3	2
Silene nutans	Nottingham catchfly	Caryophyllaceae	perennial	5-8	white	2	1
Silene vulgaris	Bladder campion	Caryophyllaceae	perennial	5-9	white	2	1
Stachys recta	Stiff hedgenettle	Lamiaceae	perennial	6-10	light yellow	3	1
Thymus pulegioides s. l.	Broad-leaved thyme	Lamiaceae	perennial	6-10	purple	3	2
Trifolium pratense	Red clover	Fabaceae	perennial	6-9	purple	3	3

Nek (nectar: four classes from none (=0) to very much (=4), Pol (pollen: four classes from none (=0) to very much (=4)

Wheel track seed mixture

Scientific species name	Species name	Plant family	Lifespan	Flowering months	Flower color	Nek	Pol
Achillea millefolium	Common yarrow	Asteraceae	perennial	6-10	white	1	2
Cichorium intybus	Chicory	Asteraceae	perennial	7-10	light blue	3	3
Festuca brevipila	Hard fescue	Poaceae	perennial	5-7	yellow-green	k. A.	k. A.
Festuca valesiaca	Volga fescue	Poaceae	perennial	6-7	yellow-green	k. A.	k. A.
Lotus corniculatus	Common bird's-foot trefoil	Fabaceae	perennial	6-8	yellow-green	3	1
Medicago lupulina	Hop clover	Fabaceae	perennial	5-10	yellow-green	2	2
Plantago lanceolata	Narrowleaf plantain	Plantaginaceae	perennial	5-10	green-brown	0	3
Trifolium pratense	Red clover	Fabaceae	perennial	6-9	purple	3	3

Information on plant characteristics and properties was taken from the following sources:

BiolFlor database (2024): https://www.biolflor.de (25/03/2024)

FloraWeb database (2024): https://www.floraweb.de (29/04/2024)

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Pritsch, G. (2018): Bienenweide: 220 Trachtpflanzen erkennen & bewerten. Stuttgart: Kosmos.

Stiftung Naturschutz Schleswig-Holstein (2016): Trachtkalender für Schleswig-Holstein (Heil- und Gewürzpflanzen, Heimische Gehölze und Kletterpflanzen, Heimische Krautige Pflanzen, Nicht heimische Gehölze, Nutzpflanzen, Zierpflanzen).

Establishment and maintenance of flowering inter-rows

The establishment of a species- and flower-rich greening in the vineyard has several advantages. It provides better erosion protection in the vineyard inter-rows and makes them more resistant to summer droughts. The native, site-appropriate wild plants are also valuable sources of nectar and pollen for beneficial insects and pollinators. In addition, a flower-rich vineyard inter-row can also improve the aesthetic value of vineyards and be included in the marketing of wines. The following recommendations for establishing and maintenance should be observed in order to create and maintain this type of greenery, which has many advantages.

Establishment of a flowering inter-row in the vineyard

With what?

- Certified seeds from regional wild plant propagation (**VWW-Regiosaaten®**, **RegioZert®**)
- 30–40 wild plants per mixture for the middle section
- 5–10 traffic-tolerant grasses and forbs for the wheel track
- **Seeding rate**: approx. 1.5 g/m²; mixed with filler (e.g. GMO-free maize meal) to 5-10 g/m² (up to 20 g/m² for hand sowing)

How?

- Thorough seedbed preparation if grass-dominated vegetation exists (e.g. by plowing or tilling)
- When sowing open inter-rows, a superficial disturbance shortly before sowing is sufficient
- Surface sowing by hand, with a pneumatic seed drill or a seed drill (coarse seed wheels) → Raise seed coulters and harrows (do not bury seeds, wild plants are light germinators)
- If the middle section and wheel track are sown separately (middle section approx. 70-80 cm, depending on the wheelbase of the equipment used in the vineyard; 35 cm wheel track on each side), the seed box must be divided accordingly
- Rolling recommended (soil closure of the seeds, protection against rinsing)

In the case of frequent traffic, it is advisable to create biodiversity inter-rows alternating with wheel tracks, as wild plants usually take two years to well established. After that, the wheel track can also be converted into biodiversity inter-rows.

When?

Preferably from August to October (as soon as the nights get too cold, the seed will no longer germinate); if necessary, sow in spring until the end of March. Problem: Spring and early summer drought; the seed needs 10-14 days of moisture to germinate.

Photo: Lea Sieg

Use and maintenance

Development care (1st year after sowing)

- Mulch 2 to 3 times (or mow with removal) at a height of 10-15 cm; April/May, June/July, possibly August (optimal: when the stand of undesirable [**mostly annual**] species is knee-high→ these should not reach seed maturity); if dominant stands of amaranth develop, mow deeper

Follow-up maintenance (from the 2nd year)

- Mulching (or mowing with removal) at a height of approx. 10 cm until mid-May on half of the biodiversity inter-rows, second half 4 weeks later, on very productive sites second mowing in August/September (possibly only the May mowing variants, depending on growth)
- Extensive sheep grazing with landscape grazing breeds (e.g. Suffolk, Shropshire, Ouessant) is possible from bud break until the beginning of grape ripening. Neighboring alternative areas (orchards, grassland) are advantageous

Literature

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Orzessek, D., Kirmer, A., Ballerstein, I. (2022): Die Erhöhung der Biodiversität im Weinbau dargestellt am lehr- und Versuchsweinberg der Hochschule Anhalt. Deutsches Weinbau-Jahrbuch 2022 (73. Vol.): 183–190.

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Schoof, N., Kirmer, A., Luick, R., Tischew, S., Breuer, M., Fischer, F., Müller, S., von Königslöw, V. (2020): Schafe im Weinbau - Chancen und Herausforderungen, praktische Umsetzung und Forschungsziele. Naturschutz und Landschaftsplanung 52 (6): 272–279.

Selected plant species in the seed mixture

On the following pages, the 25 most common wild plant species from the seed mixtures (see p. 9) that could be detected in the demonstration vineyards in the Saale-Unstrut region in the years 2021 to 2024 are presented (sorted by flower color).

Photo: Lea Sieg

Common yarrow
Achillea millefolium

Family	Asteraceae
Flowering time	June to October
Growing height	30 to 60 cm

Flower
- flowers in compact umbrella panicle
- flower heads with a few yellow tubular flowers and white ray florets (rarely pale pink)

Leaf
- alternating
- elongated, pinnately divided

Young plant
- in younger stages easily confused with common ostrich daisy and dyer's chamomile!

Interesting facts
The delicate leaves of the common yarrow can be used in many ways in the kitchen, e.g. in salads, pesto, tea or as a spice.

Photo: Eckhard Willing

Photo: Daniel Elias

Bladder campion
Silene vulgaris

Family	Caryophyllaceae
Flowering time	June to September
Growing height	10 to 80 cm

Flower
- white, with deeply split petals
- calyx strongly inflated, without ribs, but with a network of red veins

Leaf
- opposite
- blue-green, glabrous, waxy
- linear to lanceolate

Young plant
- blue-green, waxy
- entire, lanceolate leaves

Interesting facts

The Bladder campion is a typical moth flower. Although it is open during the day, it only releases its attractive scent at night.

Narrowleaf plantain
Plantago lanceolata

Family	Plantaginaceae
Flowering time	May to September
Growing height	10 to 50 cm

Flower
- greenish-white, densely arranged as a spike
- stamens with long white filaments protruding far above the crown leaves

Leaf
- long, narrow, lanceolate leaves, with entire margins
- 3 to 5 parallel veins

Young plant
- rosette-forming with multiple rosettes per plant

Photo: Katrin Schneider

Interesting facts

Narrowleaf plantain is one of the oldest known medicinal plants. It was already used by the ancient Greeks and Romans as a remedy for respiratory diseases, skin injuries and gastrointestinal complaints.

Photo: Eckhard Willing

Oxeye daisy
Leucanthemum ircutianum

Family	Asteraceae
Flowering time	June
Growing height	20 to 80 cm

Flower	• white heads with yellow centers • marginal flowers often larger with conspicuous shape
Leaf	• lanceolate, hairy with blunt tip • notched or sawn in the lower third
Young plant	• rosette with 5 to 10 ovate, bent leaves, diameter 5 to 10 cm • hairy upper side

Interesting facts

The flower heads of the plant move with the sun during the day to absorb the maximum amount of light.

Yellow scabious
Scabiosa ochroleuca

Family	Dipsacaceae
Flowering time	July to October
Growing height	20 to 60 cm

Flower
- flower heads hemispherical, marginal flowers enlarged
- calyx bristles chestnut red, or brownish

Leaf
- alternate
- matt-velvety hairy, gray-green
- basal and stem leaves pinnately lobed

Young plant
- rosette with matt velvety hairy, light green leaves, initially entire to slightly crenate, then pinnately lobed

Photo: Uta Anhalt

Interesting facts

Pollinators still enjoy the large supply of nectar and pollen of the yellow scabious in autumn.

Photo: Uta Anhalt

Yellow bedstraw
Galium verum agg.

Family	Rubiaceae
Flowering time	June to September
Growing height	20 to 70 cm

Flower
- branched, rather elongated inflorescence
- smells of honey

Leaf
- standing in whorls
- lanceolate, ≤ 1 mm wide (narrower than white bedstraw)
- leaf edge rolled down
- dark green, glossy

Young plant
- tender, often reddish overflowing stem
- see leaf characteristics

Interesting facts

As their name suggests, rennet herbs have a coagulating effect and were used as a rennet ferment for cheese production. Even today, rennet is still used for Chester cheese. It was also used as a dye and medicinal plant, e.g. for urinary problems.

Kidney vetch
Anthyllis vulneraria s. l.

Family	Fabaceae
Flowering time	May to August
Growing height	5 to 60 cm

Flower
- arranged in flower heads
- bright yellow to pink, usually reddish overflowing as a bud

Leaf
- (oblong-)oval
- unpaired pinnate, pinnae larger towards the end

Young plant
- basal leaves undivided or with enlarged terminal leaflets
- long stemmed and mostly 1-toothed

Interesting facts

As a deep-rooting plant, it develops a long taproot that ensures good aeration and permeability in the soil. Kidney vetch was traditionally used to heal wounds. Due to its anti-inflammatory properties, it was also used to soothe eczema and rashes

Photo: Michael Bulau

Photo: Ralph-Thomas Ohlhoff

St. John's wort
Hypericum perforatum

Family	Hypericaceae
Flowering time	June to August
Growing height	15 to 80 cm

Flower	• golden yellow flowers in a racemose inflorescence
Leaf	• cross-opposed • elliptical to almost linear • translucent dots (cut off the leaflets and hold them up to the light)
Stem	• stem double-edged, pithy
Young plant	• tender leaves with spots already visible

Interesting facts

The spotted hard hay, better known as St. John's wort, is used as a medicinal plant for mild depression and to sooth (not prevent!) sunburn.

Common bird's-foot trefoil
Lotus corniculatus

Family	Fabaceae
Flowering time	June to August
Growing height	20 to 30/100 cm

Flower
- 3 to 8 flowers in an umbellate inflorescence
- keel tip sometimes reddish
- keel with right-angled knee underneath

Leaf
- typical for clover, consisting of 3 obovate leaflets, bluntly pointed
- bluish-green
- two additional stipules of approximately the same type

Young plant
- see leaf characteristics, leaves often folded lengthwise in the middle

Interesting facts
Horn clover is not only a good forage plant for livestock, but is also very popular among butterflies and wild bees.

Photo: Uta Anhalt

Photo: Eckhard Willing

Hop clover
Medicago lupulina

Family	Fabaceae
Flowering time	May to October
Growing height	15 to 60 cm

Flower	• yellow with five crown leaves • arranged in dense clusters
Leaf	• unpaired tripartite feathered • hairy • ovoid with blunt tip
Young plant	• 3 to 5 leaves, three-part with a length of 1 to 2 cm

Interesting facts

Hop clover is not only an important forage plant for sheep and goats, but also an important nectar supplier for bees and butterflies.

Dyer's chamomile
Anthemis tinctoria

Family	Asteraceae
Flowering time	June to September
Growing height	30 to 60 cm

Flower
- disc of tubular flowers initially flat, later curved upwards

Leaf
- gray-green
- comb-shaped pinnate, leaflets serrate to pinnately lobed, spiny-pointed tips

Young plant
- in some stages easily confused with common yarrow or daisy

Interesting facts

The dyer's chamomile attracts numerous insects and was formerly used as a dye and medicinal plant. The coloring properties of the edible flowers can also be used in the kitchen, or you can use the flowers as a garnish for dishes.

Photo: Uta Anhalt

Photo: Ralph-Thomas Ohlhoff

Common poppy
Papaver rhoeas

Family	Papaveraceae
Flowering time	April to July
Growing height	30 to 90 cm

Flower
- flower buds nodding, two bristly hairy sepals
- petals overlapping, often with a black spot at the base

Leaf
- alternating
- lower 1-2 times pinnately lobed, upper almost granular, with sharply toothed margin
- bristly hairy

Young plant
- light green, pinnate leaflets with larger terminal section, hairy

Interesting facts

Before flowering, the young leaves of the poppy are a tasty salad garnish when eaten raw (the taste is similar to cucumber) or can be cooked like spinach. Poppy bees use the red petals to dress their „Earth house" from.

Small burnet
Sanguisorba minor ssp. minor

Family	Rosaceae
Flowering time	May to August
Growing height	15 to 50 cm

Flower	• spherical flower heads • upper flowers female with red stigmas, lower male with typically long, over-hanging, yellowish stamens
Leaf	• alternating • feathered, sawn • leaflets 5 to 9 teeth on both sides, short stalked • blue-green
Stem	• petiole often reddish
Young plant	• observe leaf characteristics

Interesting facts

The leaves of the small burnet are edible and taste like cucumber. The plant is one of the seven classic spices in the Frankfurt Green Sauce.

Photo: Annette Münchenberg

Photo: Katrin Schneider

Sand sparrow
Onobrychis arenaria

Family	Fabaceae
Flowering time	June to July
Growing height	10 to 30 cm

Flower	• pink-purple • five crown leaves that open like trumpets
Leaf	• unpaired feathered • often hairy • blunt leaf tip
Young plant	• unpaired pinnate, 2 to 5 cm long • flat rosette

Interesting facts

The sand sparrow has very deep-rooted roots that can reach up to 1 meter deep into the soil. This enables the plant to absorb water and nutrients from deeper layers of the soil.

Red clover
Trifolium pratense

Family	Fabaceae
Flowering time	June to September
Growing height	5 to 80 cm

Flower
- pink-purple with five crown leaves
- arranged in dense baskets

Leaf
- tripartite leaf, leaflets ovate to elliptical
- often bright v-shaped markings on the leaflets

Young plant
- three-part leaves in a flat rosette

Photo: Eckhard Willing

Interesting facts

Red clover is a legume that is able to bind nitrogen from the air. This nitrogen is then released into the soil and can be used by other plants.

Photo: Eckhard Willing

Musk mallow
Malva moschata

Family	Malvaceae
Flowering time	June to October
Growing height	20 to 80 cm

Flower	• clustered at the top, as well as individually in leaf axils • outer sepals narrow-lineal, narrowed at the base
Leaf	• alternate • lower hand-shaped split, upper deeply split • small stipules
Stem	• with protruding, simple hairs (no star hairs visible with a magnifying glass)
Young plant	• heart-shaped, round leaves, leaf edge is roundly notched

Interesting facts

Mallows are edible: flowers can be eaten as decoration in salads, seeds like capers and leaves like spinach. The caterpillars of the mallow butterfly also love mallows. The typically spun leaves are easily to spot.

Field scabious
Knautia arvensis

Family	Dipsacaceae
Flowering time	July to August
Growing height	30 to 80 cm

Flower
- single flowers with 4 lobes

Leaf
- opposite
- mostly pinnate to pinnately lobed, rarely with entire margins
- gray-green, matt, softly hairy

Young plant
- leaves slightly toothed, softly hairy, gently narrowing into a petiole

Photo: Eckhard Willing

Interesting facts

Compared to similar scabious species, field scabious flowers have only 4 lobes instead of 5 – hence the poetic name "widow's flower".

Photo: Eckhard Willing

Common dost
Origanum vulgare

Family	Lamiaceae
Flowering time	July to September
Growing height	20 to 60 cm

Flower
- supporting leaves loosely standing, not completely covering the calyx
- lower lip in three parts, middle part largest

Leaf
- cross-opposed
- ovoid, short stalked, with fine glandular dots on the underside
- plant has an aromatic scent

Young plant Pay attention to odor and leaf characteristics!

Interesting facts

Common dost is closely related to the spice plant oregano. It can be used in many ways - as a spice, tea or medicinal plant - and its flowers are popular among insects.

Meadow knapweed
Centaurea jacea s. str.

Family	Asteraceae
Flowering time	June to August
Growing height	15 to 150 cm

Flower
- green bracts with a brown, membranous, irregularly torn appendage

Leaf
- alternate
- ovate to lanceolate, with entire margins or finely toothed

Young plant
- rosette-like growth habit, often hairy
- lanceolate leaves

Interesting facts

The pink-purple flowers of the meadow knapweed produce a lot of nectar and are particularly popular among wild bees and butterflies. Many insect species can be observed on their flowers.

Photo: Annika Schmidt

Photo: Eckhard Willing

Greater knapweed
Centaurea scabiosa s. str.

Family	Asteraceae
Flowering time	July to August
Growing height	50 to 120 cm

Flower	• bracts with black-brown appendage, which ends in a lighter comb
Leaf	• dark green, leathery leaflets • similar to scabious leaves
Young plant	• rosette leaves initially entire, partly pinnate

Interesting facts

Parts of the greater knapweed can be used for dyeing. The roots and seeds have a diuretic and wound-healing effect. Like the meadow knapweed, the plant is a strong insect magnet.

Wild basil
Clinopodium vulgare

Family	Lamiaceae
Flowering time	July to September
Growing height	20 to 60 cm

Flower
- 3 to 10 flowers densely arranged in a semi-spherical whorl
- crown tube hairy

Leaf
- cross-opposed
- ovoid, edge slightly notched
- both leaf sides hairy
- foliage leaves not dotted on the underside
- plant is fragrant, but less intense than oregano

Young plant
- see leaf characteristics

Interesting facts

The leaves of the wild basil are edible and can be used fresh or dried, for example as a digestive spice.

Photo: Eckhard Willing

Photo: Judith Doberstein

Meadow sage
Salvia pratensis

Family	Lamiaceae
Flowering time	May to August
Growing height	30 to 60 cm

Flower	• flowers arranged in tiers in fals whorls • large curved upper lip
Leaf	• cross-opposed • undivided, triangular, heart-shaped at the base, leaf margin crenate to serrated • leaf surface matt, rough, with a pronounced veins network
Young plant	• recognizable by the typical leaves • plant partially appearing purple

Interesting facts

When long-tongued bees, such as bumble-bees, visit meadow sage, a lever mechanism deposits a pollen package on their backs to pollinate other flowers. Try it for yourself!

Field larkspur
Consolida regalis

Family	Ranunculaceae
Flowering time	May to August
Growing height	10 to 50 cm

Flower
- racemose inflorescence with 5 to 8 long-stemmed flowers, with a long spur
- appearing like a dolphin before blossoming

Leaf
- strongly divided, one to several pinnate parts, tips very narrow (approx. 1 mm)

Young plant
- rosette leaves narrow, soft, reminds of „small winter aconites“

Interesting facts
The field larkspur is a field weed that will be found especially in the first year on a side. Due to the intensification of agriculture, field weeds are becoming increasingly rare on the fields.

Photo: Uta Anhalt

Photo: Dieter Neuragoczy

Austrian flax
Linum austriacum

Family	Linaceae
Flowering time	May to July
Growing height	30 to 60 cm

Flower
- blue-violet colored with 5 crown leaves
- arranged as raceme

Leaf
- small, lanceolate leaves
- often hairy with blunt tip

Young plant
- lanceolate leaves with 1 to 3 cm length
- dense, flat rosette

Interesting facts

This very drought-resistant plant has a symbiotic relationship with certain fungi that help it to absorb water and nutrients from the soil. Linseed oil has anti-inflammatory and anti-oxidative effects.

Chicory
Cichorium intybus

Family	Asteraceae
Flowering time	July to October
Growing height	30 to 150 cm

Flower
- flower heads usually clustered in groups of 2 to 5
- only ray florets, outer edge toothed

Leaf
- basal leaves pinnately lobed with triangular, pointed sections pointing towards the leaf base; bristly hairs on the underside
- stem leaves alternate, sessile, shape very variable
- similar to yellow flowering ***Crepis biennis*** or ***Taraxacum***!

Young plant
- similar to lettuce
- elongated, soft, light green leaves, leaf margin lobed

Interesting facts

The chicory is often visited by Dasypoda bees. This spectacle can only be observed until 11 a.m., as the flowers are only open in the morning. Cichorium is also often found in malt coffee and is the original form of the winter salads we know as chicory and radicchio.

Photo: Eckhard Willing

Important beneficial arthropods in the vineyard

By creating flowering inter-rows from native wild plants, beneficial arthropods can be supported that contribute to natural pest control and pollination in the vineyard and beyond. Due to the provision of suitable nectar and pollen sources and increased structural diversity, insects such as wasps, hoverflies and ladybugs, as well as spiders, are attracted to the vineyard. Between the vines, they act as antagonists for vineyard pests such as grape berry moths, aphids and grape rust mites.

In the following, four important groups of beneficial organisms are presented that have clearly benefited from the flower-rich vineyard inter-rows (compared to conventional, grass-dominated inter-rows) within the studies of the **LIFE VineAdapt project**.

Photo: Lea Sieg

Wasps

The picture below shows a digger wasp in flight an oxeye daisy with a Colletes bee on it, on the Eulauer Heideberg. Adult digger wasps feed on nectar or pollen. However, these wasps collect insects or insect larvae for their offspring, hence they can act as natural predators of pest organisms.

Photo: Lea Sieg

Hoverflies

The hoverfly on viper's bugloss in the picture below was taken in a project vineyard in Eger (Hungary). While the adult flies are extremely relevant as pollinators due to their visits to flowers, the larvae of hoverflies are predators and eat various insect larvae – including potential pests in viticulture.

Photo: Tamás Miglécz

Ladybugs

Ladybugs are further beneficial antagonists of crop pests. Both the adult beetles and in particular their larvae consume large quantities of e.g. aphids and spider mites. The picture below shows a ladybug on sown red clover in a vineyard near Denstedt (Weimar).

Photo: Lea Sieg

Spiders

Spiders live mainly as predators. They are important beneficial arthropods in viticulture and agriculture, as their main diet consists of flies, mosquitoes, (winged) aphids, fungus gnats, whiteflies and other insects. The picture below shows the goldenrod crab spider, a so-called ambush hunter, on field scabious on the Köppelberg near Bad Kösen, which is greened with wild plants.

Photo: Lea Sieg

The wandering crab spider (picture below) is a running spider that stalks its prey and then catches it very quickly. In the picture it is sitting on the oxeye daisy in a wild plant inter-row on the Kreisberg near Höhnstedt.

Photo: Lea Sieg

Typical wild bees in the vineyard

More than half of all wild bee species in Germany are currently under threat. Vineyards can contribute to the promotion of this important pollinator group by establishing species-rich inter-rows sown with regional wild plants. The studies in the **LIFE VineAdapt project** showed that the number of wild bee species and individuals was higher in the species-rich flowering inter-rows than in the grass-dominated control inter-rows. The use of native wild forbs from different plant families in the seed mixture (see page 9) enables it to be utilized as nectar and pollen sources by the wild bees that occur in the region.

Photo: Lea Sieg

The following overview shows the 13 most common bee species that occurred on the established flowering inter-rows in the demonstration vineyards of the Saale-Unstrut region between 2021 and 2024. The presentation is supplemented by seven selected bee species that occurred less frequently in the studied vineyards, but are characterized by special food or nesting requirements.

Common bee species

Scientific species name	Species name	Number of individuals		Foraging behaviour; special nesting behaviour	Red List	
		Flowering inter-rows	Control inter-rows		GER	Saxony-Anhalt
Andrena flavipes	Yellow-legged mining bee	36	26	polylectic		
Bombus lapidarius	Red-tailed bumblebee	83	3	polylectic		
Halictus simplex	Common furrow bee	45	8	polylectic		
Lasioglossum glabriusculum	Smooth furrow bee	148	73	polylectic		3
Lasioglossum laticeps	Broad-faced furrow bee	46	22	polylectic		
Lasioglossum lineare	Linear furrow bee	36	6	polylectic	3	3
Lasioglossum malachurum	Sharp-collared furrow bee	406	128	polylectic		
Lasioglossum morio	Common green furrow bee	55	64	polylectic		
Lasioglossum nitidiusculum	Tufted furrow bee	37	8	polylectic	V	
Lasioglossum pauxillum	Lobe-spurred furrow bee	301	89	polylectic		
Lasioglossum politum	Shiny furrow bee	255	29	polylectic		
Lasioglossum villosulum	Shaggy furrow bee	41	19	polylectic		
Nomada flavoguttata	Small nomad	43	10	parasitic on *Andrena minutula*		

Red List: 2= critically endangered, 3= endangered, V= watchlist

Specialized bee species

Scientific species name	Species name	Number of individuals		Foraging behaviour; special nesting behaviour	Red List	
		Flowering inter-rows	Control inter-rows		GER	Saxony-Anhalt
Chelostoma campanularum	Small scissor bee	2	0	oligolectic on Campanulaceae		
Colletes similis	Bare-saddled Colletes	26	0	oligolectic on Asteraceae	V	
Eucera nigrescens	May long-horned bee	22	1	oligolectic on Fabaceae		
Osmia aurulenta	Gold-fringed mason bee	27	2	polylectic; nests in snail shells		
Osmia spinulosa	Spined mason bee	2	0	oligolectic on Asteraceae; nests in snail shells	3	
Pseudoanthidium nanum	Stalk wool-carder bee	7	0	oligolectic on Asteraceae	3	
Tetralonia malvae	Mallow long-horned bee	1	0	oligolectic on Malvaceae	2	3

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Selected wild bee findings (see also table on p. 47) are shown below during flower visits at sown wild forbs in the vineyard inter-rows of the winegrowers participating in the project.

The first three photos show foraging generalists that collect pollen from a wider range of host plants (polylectic bees). In the picture below, the gold-fringed mason bee is visiting flowers on the common clover on the Kreisberg in Höhnstedt. Its nesting method is special – the bee builds its brood cells in empty snail shells, which is why vineyards are one of its characteristic habitats.

Photo: Lea Sieg

Other common representatives are the red-tailed bumblebee, seen here on a sand sparrow on the Kreisberg in Höhnstedt, and a furrow bee shown in the last photo on an oxeye daisy on the Eulauer Heideberg.

Photo: Lea Sieg

Photo: Lea Sieg

The other three wild bee species shown here are specifically dependent on flowers of Asteraceae, Malvaceae and Campanulaceae for pollen collection (oligolectic bees). On these pages you can see the bare-saddled Colletes on Oxeye daisy on the Eulauer Heideberg, as well as two males of the mallow long-horned bee, which is highly endangered in Germany, on musk mallow in a vineyard near Höhnstedt and the small scissor bee on harebell on the Köppelberg near Bad Kösen.

Photo: Lea Sieg

Photo: Lea Sieg

Photo: Lea Sieg

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