

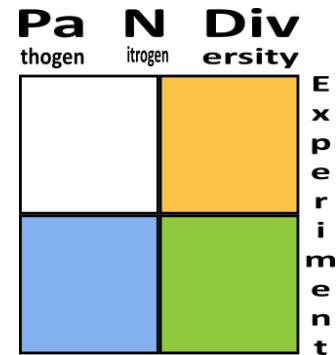
The PaNDiv experiment

Flora guide 5.0

07.2019 - Make PaNDiv great again

For the attention of the weeding helpers

Seraina Cappelli, Mervi Laitinen, Tosca Mannall,
Noémie Pichon, Hugo Vincent



Remember:
if you're not sure about what to take out
of the plot, **ask for help.**





Licence to kill

If you want to learn some plants in an entertaining way, check out the homepage www.biofotoquiz.ch. In the section "Advanced"/"Fortgeschritten" under "Plants of the midland & jura"/"Pflanzen des Mittellandes & Juras" the lists "False Oatgrass meadow"/"Frommental-Wiesen" and "Cocksfoot & ryegrass meadows"/"Knaul- & Raigraswiesen" with many of the species and weeds of the PaNDiv experiment.

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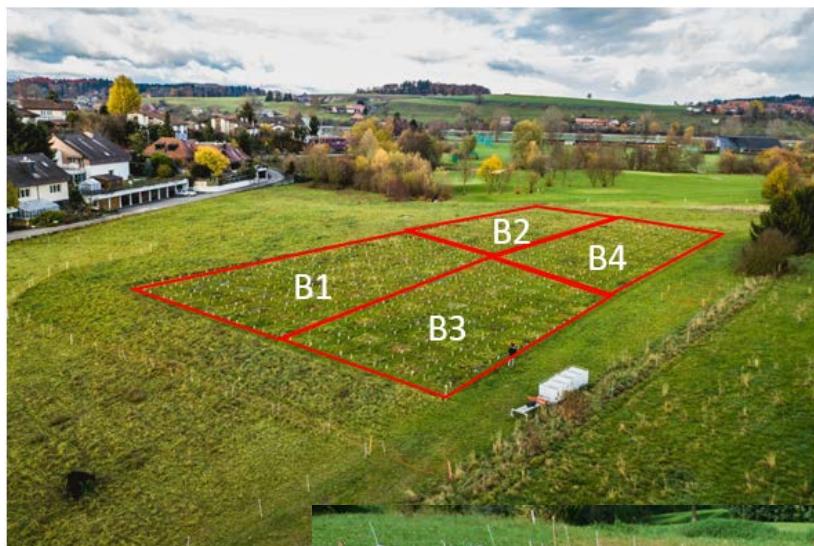
Please note: Although there are fun facts saying which plants are edible, please do not eat any plants from the field even the weeds ☺

PaNDiv Project

We have set up a large field experiment in Münchenbuchsee near Bern to investigate the mechanisms by which nitrogen enrichment affects ecosystem functioning. N enrichment changes soil chemistry and directly increases plant growth and ecosystem productivity. At the same time, it could indirectly affect ecosystem function by causing a loss of plant species richness, a shift in functional trait composition towards fast growing plant species and an increase in the abundance of plant enemies such as foliar fungal pathogens. This experiment factorially manipulates N addition, plant species richness, functional composition (two pools of fast and slow growing species defined based on leaf economic traits) and fungal pathogens (using fungicide) on 336 2m x 2m plots, which were sown in autumn 2015. We will measure a range of ecosystem functions related to productivity, biogeochemical cycling and litter decomposition and will monitor the diversity and abundance of the foliar pathogen communities.

In order to maintain the species richness and composition on each plot during the whole experiment it is necessary to remove unwanted weeds. We do this three times a year.

Block design



Plot design



Plot label



There are 8 labels that are wrong and ugly corrected with violet paint. **Ao** has been replaced with **Am** in plot **51, 85, 203** and **254**. **Hs** has been replaced with **Hi** in plot **84, 103, 192** and **277**!

Species codes (20 sp.)

Poa trivialis = **Pt**

Daucus carota = **Dc**

Lolium perenne = **Lp**

Salvia pratensis = **Sp**

Holcus lanatus = **Hi**

Prunella grandiflora = **Pg**

Helictotrichon pubescens = **Hp**

Plantago media = **Pm**

Festuca rubra = **Fr**

Galium album = **Ga**

Dactylis glomerata = **Dg**

Rumex acetosa = **Ra**

Bromus erectus = **Be**

Heracleum sphondylium = **Hs**

Anthoxanthum odoratum = **Ao**

Centaurea jacea = **Cj**

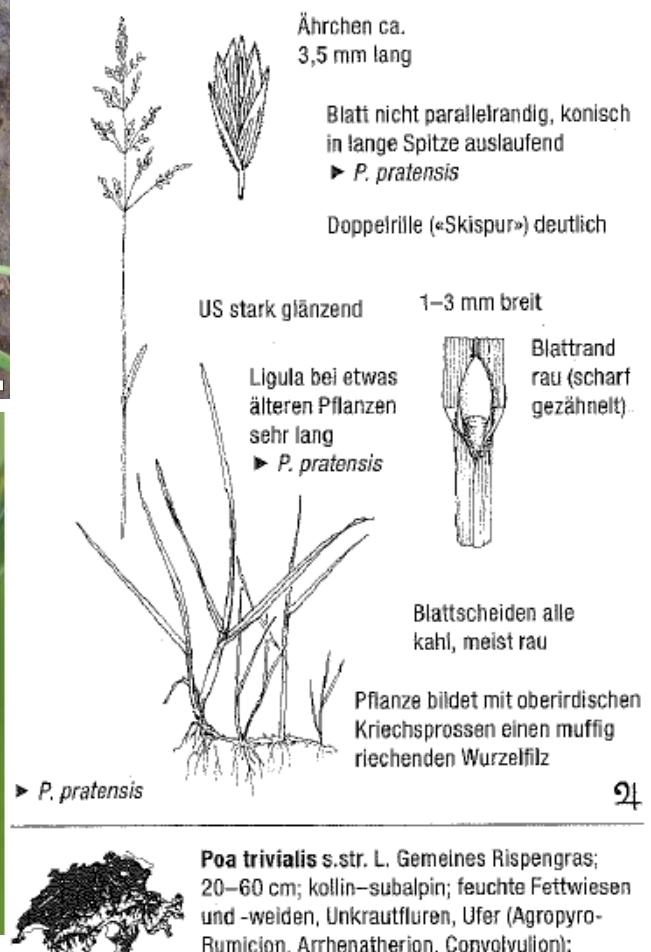
Crepis biennis = **Cb**

Taraxacum officinale = **To**

Achillea millefolium = **Am**

Anthriscus sylvestris = **As**

Poa trivialis



Characteristics:

- Thin, soft and shiny leaves
- Runners
- Ligule long and pointy
- No hairs
- Can often been found in the shade of other plants



Invaders that look like *Poa trivialis*

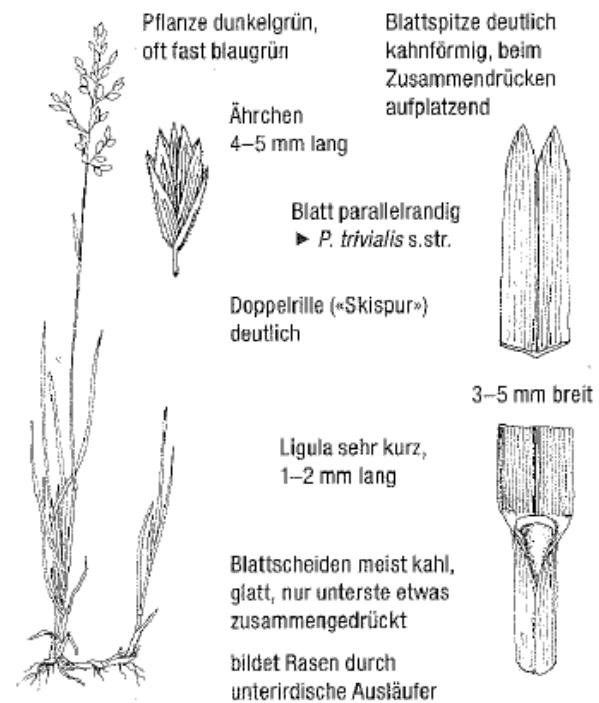
Poa annua



Characteristics:

- Boat-shaped tip
- Smooth leaf blades
- Pointy ligule
- Slightly flattened stem
- Very common invader

Poa pratensis



► *P. angustifolia*, *P. palustris*, *P. trivialis* s.str.

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***Poa pratensis* L.** Wiesen-Rispengras; 20–50 cm; kollin–subalpin; Fettwiesen und -weiden, Wegränder, Unkrautfluren (*Arrhenatherion*, *Polygono-Trisetion*, *Aegopodion*); gutes Futtergras; holarkt; FH: 2843.

Characteristics:

- Similar to *Poa annua* but ligule is very short
- Two deep “tramlines” down the centre of the leaf blade



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Lolium perenne



Pflanze grasgrün, kahl, feiner,
weniger kräftig als *L. multiflorum*

OS deutlich gerillt,
US fettig glänzend

ganzes Blatt gekielt
► *Festuca pratensis* s.str.

3–4 mm breit



Ligula 1–2 mm

Blatt oft mit deut-
lichen, sichelförmigen
Blattöhrchen



Scheide seitlich
abgeflacht



► *Cynosurus cristatus*

Blatt in der Knospen-
lage gefaltet

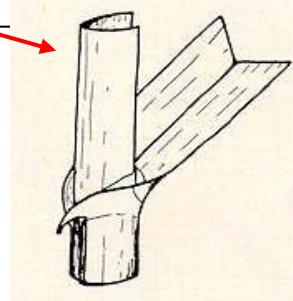
21



Lolium perenne L. Englisches Raygras;
20–50 cm; kollin–montan; Fettweiden,
Trittrasen, Parkrasen (*Cynosurus*); tritt- und
schnittfester Pionier; eurasiat; Fl: 2865.

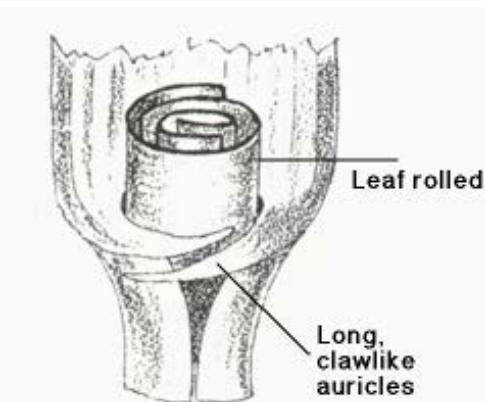
Characteristics:

- “Communist” auricles grip the stem
- Prominent parallel veins
- Dark green leaves (mostly)
- Back of the leaf is shiny
- Very short ligule
- No hairs
- Younger plants grow “star” like
- Leaf folded



Invaders that look like *Lolium perenne*

Lolium multiflorum



Characteristics:

- Much bigger leaves
- "Hairs" on the flowers
- Bigger "communist" auricle



Festuca arundinacea



Characteristics:

- Harsh leaves with fine "teeth" on the edges
- Hairs on auricle

Elymus repens



Characteristics:

- Underside of the leaf is not shiny
- Smells like fresh grass when crushed



Holcus lanatus



Pflanze hellgrün bis graugrün, ohne Ausläufer

5–8 mm breit

Ligula 2–3 mm,
fein gezähnt



Blatt samartig,
weich behaart

Blattscheide samartig,
gleichmäßig weich
behaart



Knoten kurz
weichhaarig

Triebgrund weisslich, mit deutlichen
rotvioletten Nerven

► *Bromus hordeaceus*



Characteristics:

- Very soft and hairy
- The base of the stem is white with pink stripes (Pyjama)
- Hairs on leaves have all the same length ca 1mm (magnifying lens!)



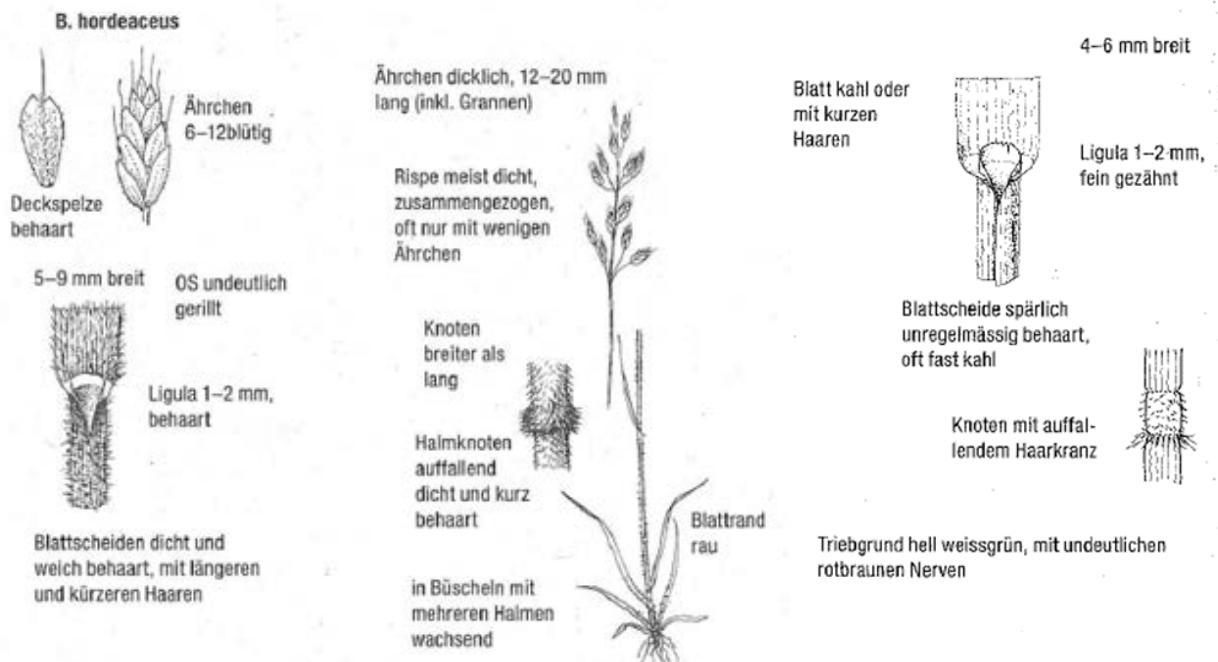
Holcus lanatus L. Wolliges Honiggras;
30–60 cm; kollin–montan; frische, nasse
Fettwiesen und -weiden (Calthion, Arrhenather-
ion); schlechtes Futtergras; europ;
FH: 2907.



Invaders that look like *Holcus lanatus*

Bromus hordeaceus

Pflanze graugrün, mit unterirdischen Ausläufern

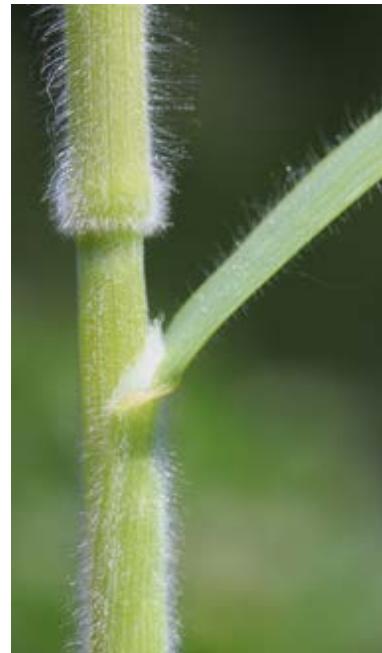


► *Holcus, B. racemosus*



Bromus hordeaceus L. (*B. mollis*); Gersten-Trespe; 20–50 cm; kollin–montan; trockene Unkrautgesellschaften, Fettwiesen, Wegränder (*Sisymbrium*, *Arrhenatherion*); Wiesunkraut; eurasiat; FH: 2788.

in warmen Gebieten sich ausbreitend



Characteristics:

- Hairs at the tip of the flower
- The base of the stem has reddish dots and green lines
- Hairs on leaves have different lengths 1-3mm (magnifying lens!)
- Nodium ("knot" on the stem) wider than long

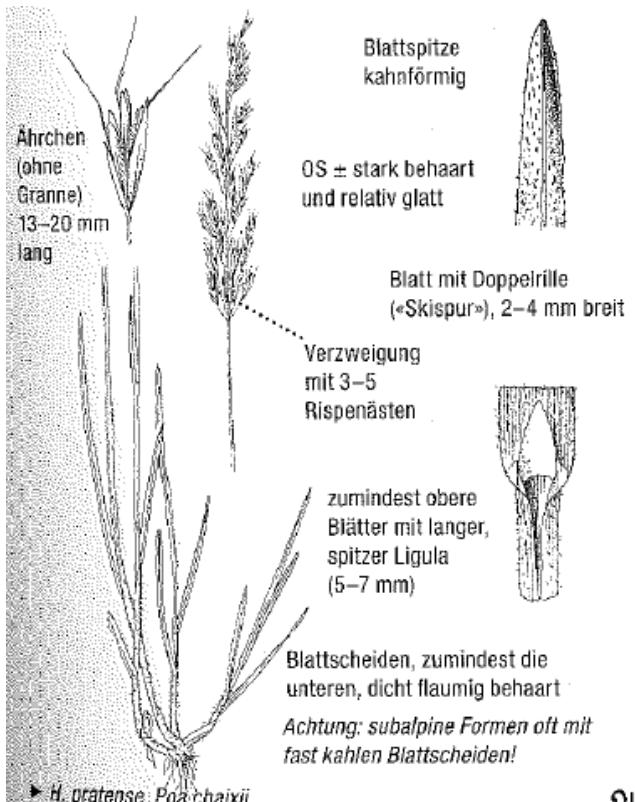
Also have a look at *Trisetum flavescens*, described as lookalike of *Anthoxanthum odoratum*!

Helictotrichon pubescens



Characteristics:

- Boat tip
- More or less hairy
- Long ligule

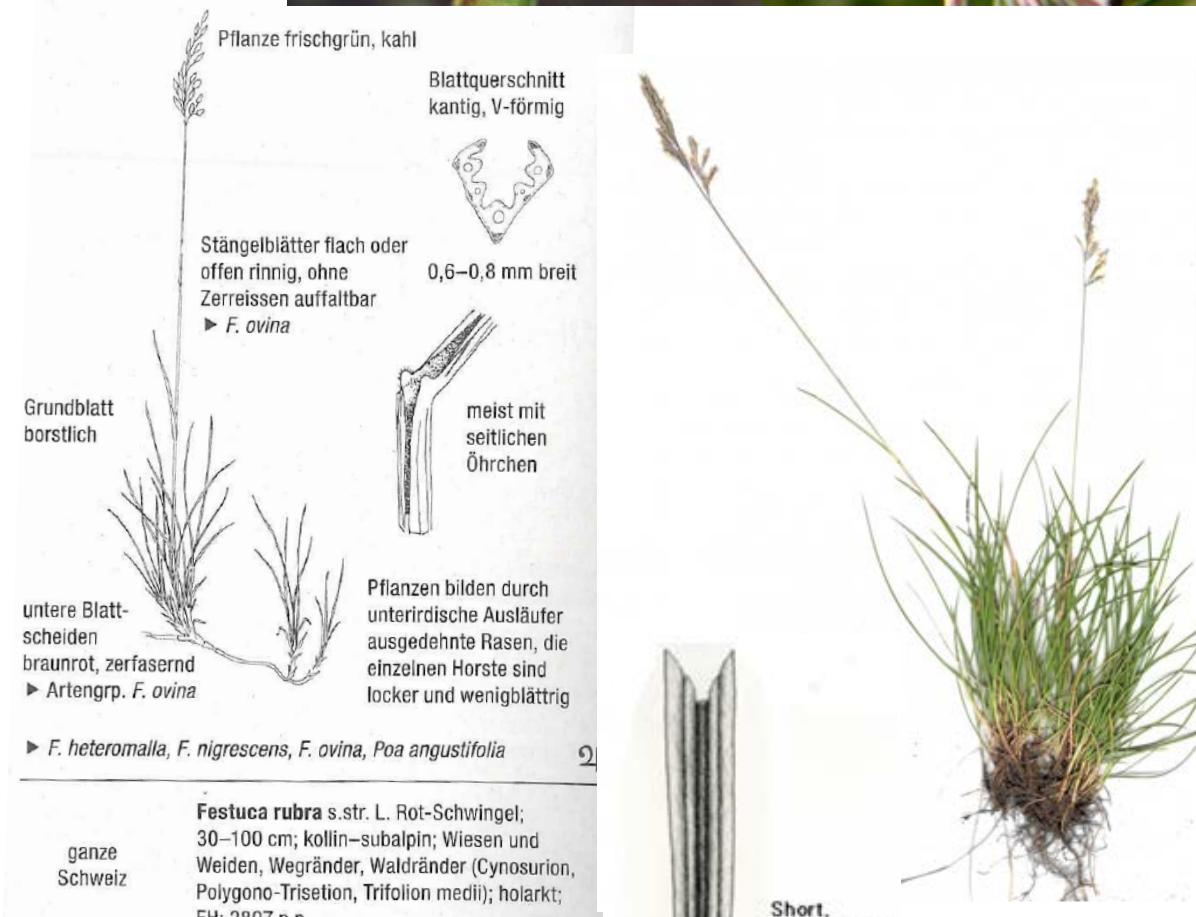


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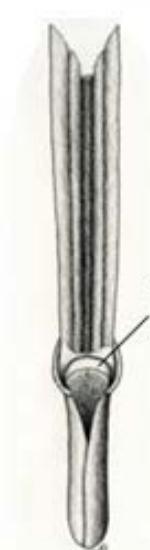
***Helictotrichon pubescens* Pilg. (*Avenula p.*);**
Flaumhafer; 30–100 cm; kollin–subalpin;
Fettwiesen, Halbtrockenrasen (*Arrhenatherion*,
Polygono-Trisetion, *Mesobromion*); mässiges
Futtergras; eurasiat; FH: 2926.

Festuca rubra



Characteristics:

- Leaves are narrow and needle like
- The base of the stem is reddish
- Leaf "breaks" when bent back
- No hairs

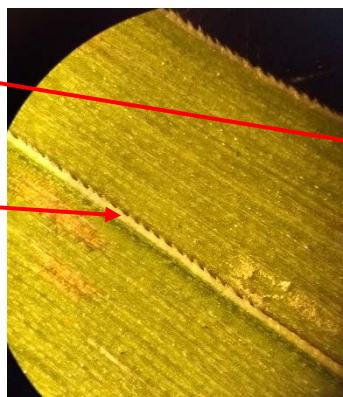


Dactylis glomerata

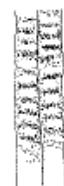


Characteristics:

- Broad, grey-green leaves
- Flattened stem
- No hairs
- Back of the midrib has a cutting edge when slid down with fingers



Pflanze kahl, hell, graugrün

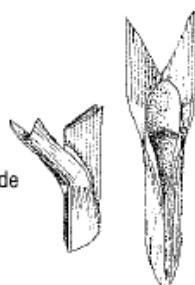


Abschnitte der Blattspreite oft gewellt

5–15 mm breit



Blatt und Blattscheide scharf gekielt



Blattscheiden platt zusammengedrückt

dichte, blattreiche Horste, ohne Ausläufer

► *Sesleria, Poa chaixii*

21

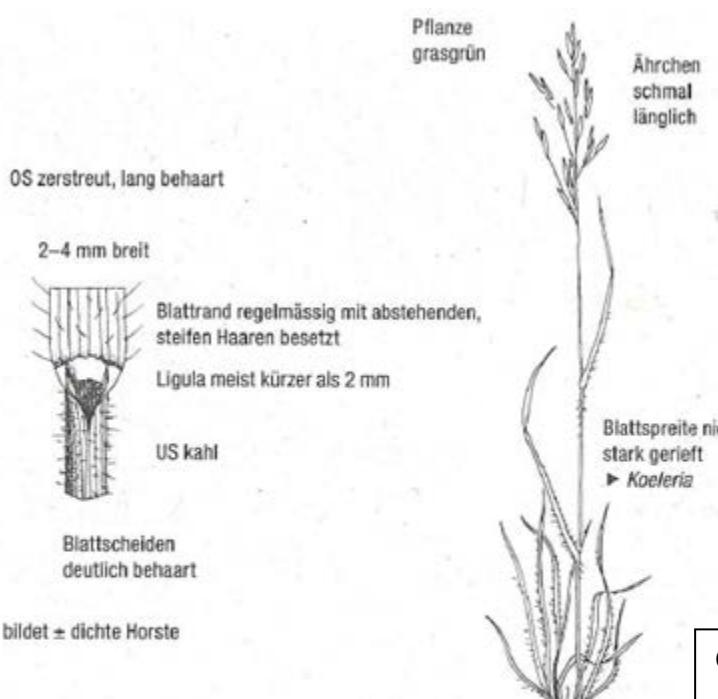


Dactylis glomerata L. Gemeines Knäuelgras;
30–100 cm; kollin–subalpin; Fettwiesen und
Unkrautgesellschaften, Weg- und Waldränder
(Arrhenatherion, Cynosurion, Alliarion); eurasiat;
FH: 2850.



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Bromus erectus



Characteristics:

- Stiff hairs on the leaves
 - ➔ Leaf edges feel rough when slid down with fingers
- Hairs form more or less a 45° angle with the leaf and are regularly spaced



***Bromus erectus* s.str. Huds.** Aufrechte Trespe;
30–80 cm; kollin–montan; bestandbildend in
Magerrasen (Mesobromion, Xerobromion, auch
trock. Arrhenatherion); mittelwertiges Futter-
gras; europa; FH: 2783.

Anthoxanthum odoratum





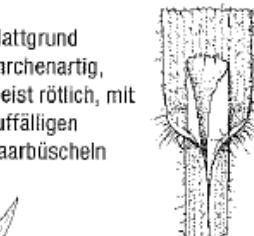
Pflanze zerrieben mit Kumaringeruch



Rispe ährenähnlich,
2–6 cm lang, früh im Jahr
erscheinend



Blatt rollt sich nach dem
Abreissen erst spät ein



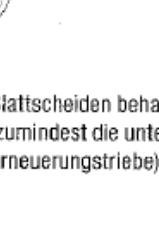
OS und US mattgrün
3–5 mm breit



Blattgrund
öhrchenartig,
meist röthlich, mit
auffälligen
Haarbüschen



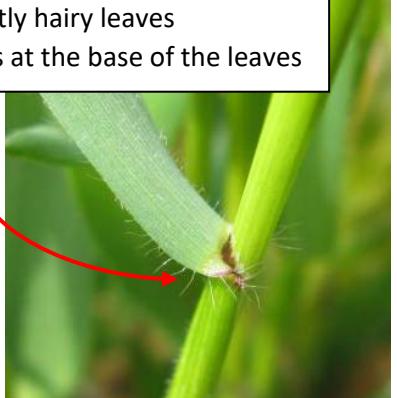
obere
Stängelblätter
sehr kurz



Blattscheiden behaart
(zumindest die unteren der
Erneuerungstrieb)

Characteristics:

- Strong smell when crushed, especially on the roots
- Broad, yellowish green and slightly hairy leaves
- Hairs at the base of the leaves



► *Agrostis capillaris*

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***Anthoxanthum odoratum* L. Gemeines
Ruchgras; 15–40 cm; kollin–alpin; Wiesen,
Weiden, lichte Laubwälder (Arrhenatherion,
Cynosurion, Mesobromion, Poion alpinae);
eurasiat; FH: 2975.**

Invaders that look like *Anthoxanthum odoratum*

Arrhenatherum elatius



Characteristics:

- Leaves are bright green, broad, slightly hairy and rough



Trisetum flavescens



Characteristics:

- “unshaved legs”: Hairs at the leave sheath > 1 mm, facing downwards



Centaurea jacea



Characteristics:

- Leaves are rough and might have short hairs
- Leaves alternate

alle Unterarten



Hüllblatt-Anhängsel
überdecken sich
► *C. nigrescens*



Stängel an der
Basis spinnwebig

untere Blätter schmal oder breit
eiförmig, in einen Stiel verschmälert,
selten gelappt
► *C. nigrescens*

Artengruppe *Centaurea jacea*

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► *C. nigrescens*, *Buphthalmum*, *Solidago*, *Aster*, *Inula*, *Knautia*



Centaurea jacea s.str. L. Gemeine
Flockenblume; 30–60 cm; kollin–
subalpin; trockene bis feuchte
Wiesen und Weiden (Arrhenather-
ion, Mesobromion); eurasiat-
(suboz-submed);
FH: 2233.

Pflanze fast kahl
Korbstiel etwas verdickt
Stängel wenig verzweigt,
Zweige eher kurz
Stängelblatt kürzer als
Internodien

Pflanze spinnwebig-flockig
behaart
Korbstiel nicht verdickt
Stängel stark verzweigt, Zweige
rutenförmig verlängert
Stängelblatt länger als
Internodien



Centaurea jacea ssp. *angusti-
folia* Gremli. (*C. pannonica*);
Schmalblättrige Flockenblume;
40–100 cm; kollin–montan; Halb-
trockenrasen, oft auf wechselfeuch-
ten Böden (Mesobromion, Molinion);
europ(subkont);
FH: 2234.



Centaurea jacea ssp. *gaudinii*
Gremli (*C. bracteata*); Gaudins
Flockenblume; 20–50 cm; kollin–
montan; felsige Hänge, Trocken-
rasen (Xerobromion, Diplachnion);
europ(mittel-süd);
FH: 2235.

Invaders that look like *Centaurea jacea*

Knautia arvensis



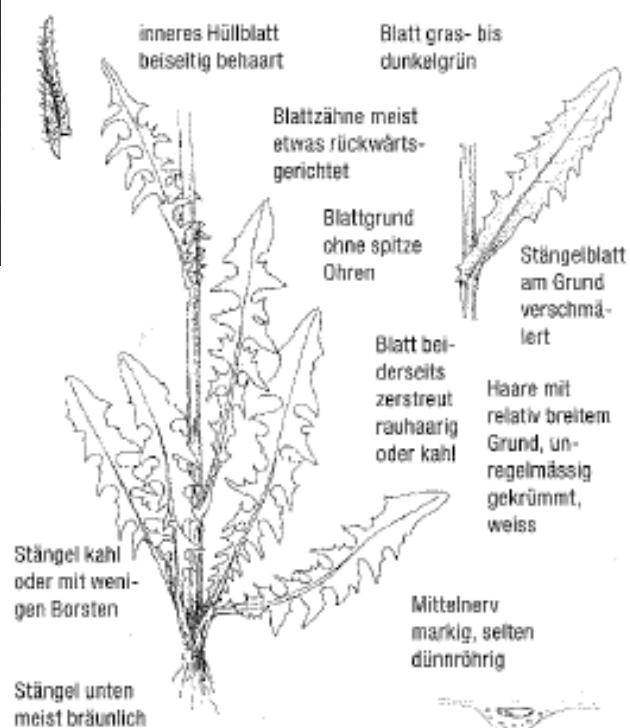
Characteristics:

- Leaves are very hairy and greyish green
- Leaves opposite
- If the leaf is carefully ripped in two parts, there are thin strings connecting the parts



"Spiderweb" like strings

Crepis biennis



Characteristics:

- Looks like *Taraxacum officinale* but is almost always hairy
- Has at least tiny hairs/ "spines" on the back of the midrib



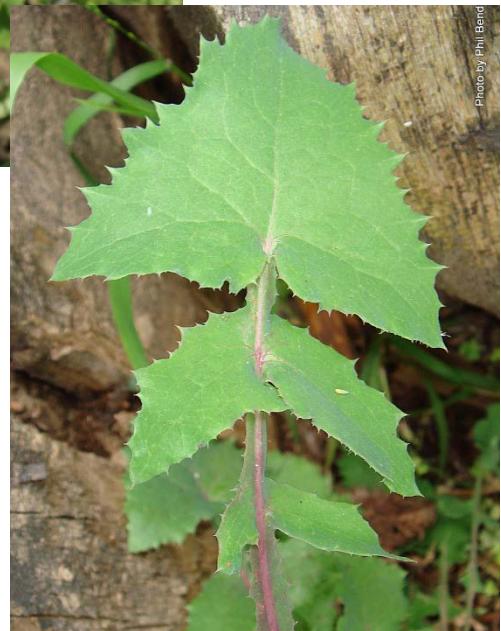
► *C. vesicaria*, *C. capillaris*, *Cichorium intybus*



Crepis biennis L. Wiesen-Pippau; 60–120 cm; kollin–montan; Fettwiesen, Wegränder (Arrhenatherion, Polygono-Trisetion, Sisymbionion); mässiger Futterwert; europäisch (subkontinental), verschleppt; FH: 2325.

Invaders that look like *Crepis biennis*

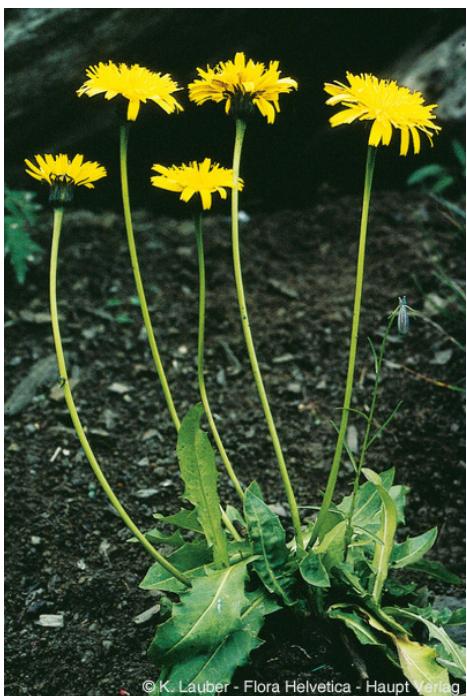
Sonchus oleraceus



Characteristics:

- Small spines on leaf margins

Leontodon sp.

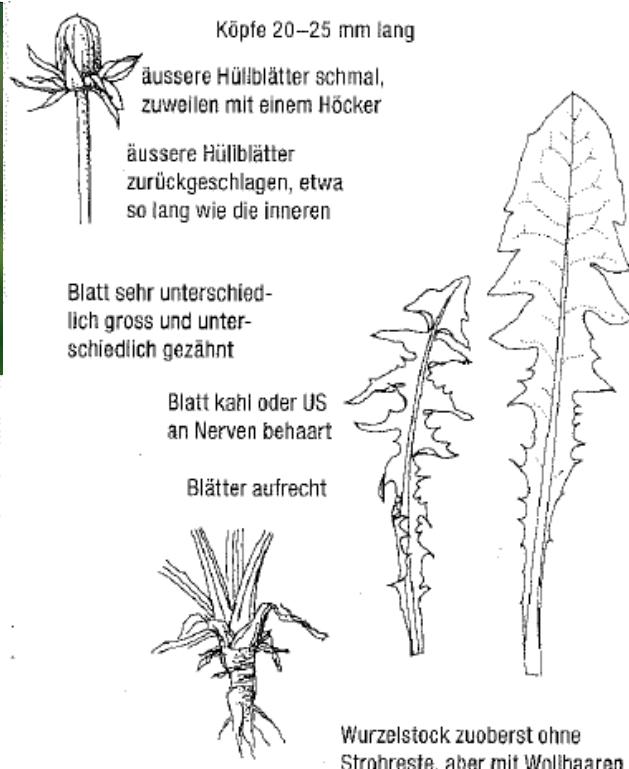


Characteristics:

- Leaves in basal rosette
- Often hairy, star hairs (magnifying lens!)



Taraxacum officinale



Characteristics:

- Looks like *Crepis biennis* but doesn't have a row of hairs/ "spines" on the back of the midrib
- Leaves in basal rosette
- Flowering stem has only one flower head



Taraxacum officinale agg. Löwenzahn; 5–30 cm; kollin–subalpin; Fettwiesen und -weiden, Wegränder, Unkrautfluren (Arrhenatherion, Polygonion aviculare, Cynosurion); formenreich; eurasiat (heute weltweit); FH: 2295.



Achillea millefolium



Pflanze frischgrün–dunkelgrün



zerstreut behaart

A. millefolium

Dolden > 3 cm breit

Endzipf. so lang wie breit

Pflanze kräftig

Stängel am Grund dicker als 2 mm, aufrecht

Blattspindel ohne Zwischenfiedern

Blatt wirkt «plump», Endzipfel kaum länger als breit

Seitenfiedern ± flach



Characteristics:

- Has a strong smell



Achillea millefolium s.l. L. Gemeine Schafgarbe; 15–50 cm; kollin–subalpin; Fettwiesen und -weiden, Wegränder (Arrhenatherion, Cynosurion); formenreich! eurasiat(suboz); FH: 2105.



Achillea roseoalba Ehrend. Helirosafarbene Schafgarbe; 20–40 cm; kollin–montan; wechselfeuchte Wiesen und Wälder (Arrhenatherion); alp(süd); FH: 2108.

Galium album



Characteristics:

- Stem 4-edged

beide Arten

Pflanze meist kahl
(selten flauimg be-
haart)

Blattrand rau, mit nach
vorne gerichteten Sta-
chelborsten

6–8 Blättchen
im Quirl

Internodien
relativ lang

Stängel
4kantig

24

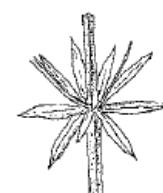
G. album

Blatt fast parallel-
randig, langsam in
die Spitze ver-
schmäler

Blatt meist etwas
dicklich, ältere Blätter
oft etwas ledrig



OS schwach
glänzend



Stängel auch unten
gerade, nicht bogig

► *G. anisophyllum*, *G. lucidum*



***Galium album* Miller.** Weisses Labkraut;
30–150 cm; kollin–subalpin; Fettwiesen und
Halbtrockenrasen, Auenwälder, Säume (Ar-
rhenatherion, Trifolion medi, Mesobromion,
Fraxinion); eurasiat(suboz); FH: 1456.

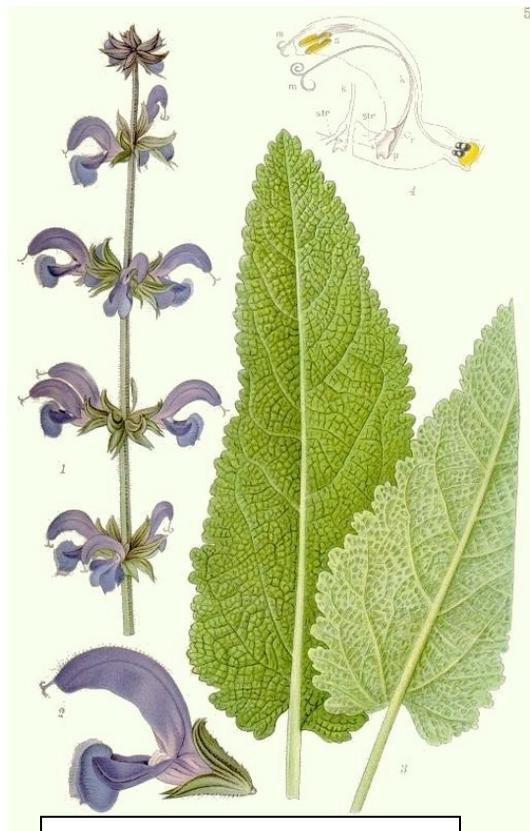
Apiaceae

Lamiaceae

Salvia pratensis

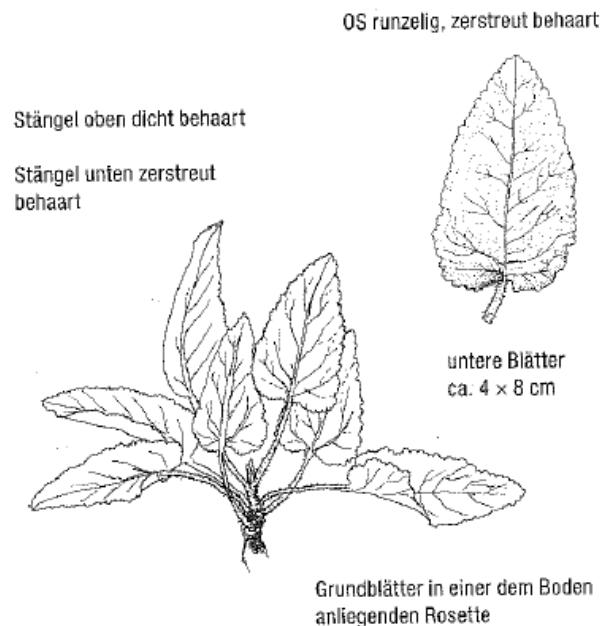


Pflanze schwach aromatisch riechend



Characteristics:

- Leaves are "wrinkled"



► *Campanula glomerata, Stachys alpina*

21



Salvia pratensis L. Wiesen-Salbei; 30–60 cm; kollin–montan; Halbtrockenrasen, trockene Fettwiesen (Mesobromion, Arrhenatherion); europ(mittel–süd); FH: 1633.

25

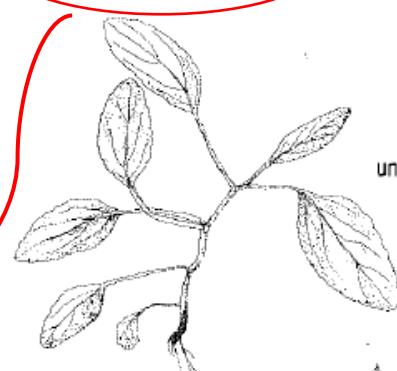
Prunella grandiflora



obere Kelchzähne
deutlich 3eckig
► *P. vulgaris*

Pflanze zerstreut behaart

Blütenstand von oberstem Blatt-
paar mind. 1 cm abgesetzt



untere Blätter ca. 2 × 6 cm

Stängel oft leicht violett



Pflanze ohne oberirdische
Ausläufer ► *P. vulgaris*

No aboveground runners

► *Ajuga, P. vulgaris*

21



Prunella grandiflora Scholler. Grossblütige
Brunelle; 10–20 cm; kollin–subalpin; kalkreiche
Halbtrockenrasen, Wald- und Wegränder (Me-
sobromion, Geranion sanguinei, Erico-Pinion);
eurasiat(kont); FH: 1594.

Characteristics:

- The first pair of leaves at least 1cm away from the flower
- Big flowers
- Hairy leaves

Red circles: compare with
Prunella vulgaris, which we have
quite often as weed

Invaders that look like *Prunella grandiflora*

Prunella vulgaris



Characteristics:

- First pair of leaves close to the flower
- Has smaller flowers than *Prunella grandiflora*

obere Kelchzähne
undeutlich, gestutzt
► *P. grandiflora*

Pflanze zerstreut behaart

Stängelblätter ganzrandig
oder kurz gezähnt

Blütenstand dem obersten
Stängelblattpaar aufsitzend

untere Blätter
ca. 1 x 4 cm



► *Ajuga, P. grandiflora*

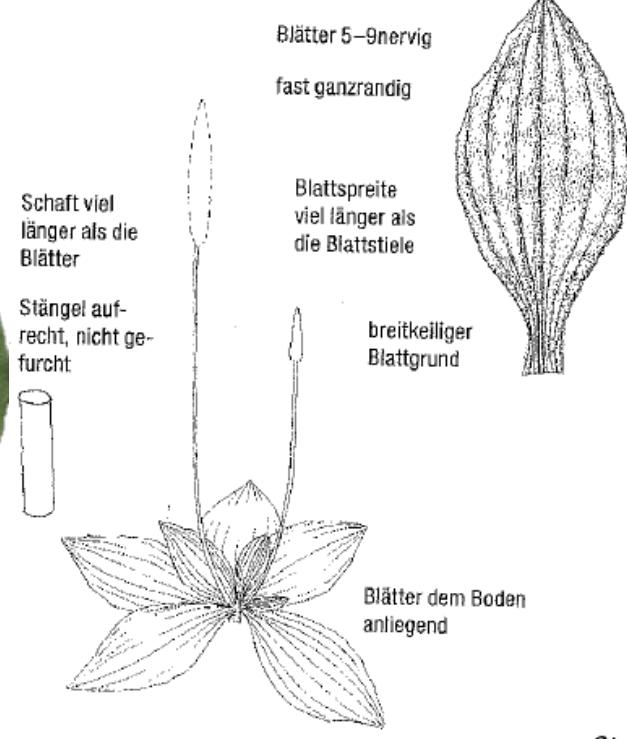
Creeping aboveground runners

21



Prunella vulgaris L. Gemeine Brunelle;
10–20 cm; kollin–subalpin; Fettwiesen und
-wiesen, Moorwiesen, Ufer (Cynosurion,
Aegopodium, Agropyro-Rumicion); eurasiat;
FH: 1595.

Plantago media



Characteristics:

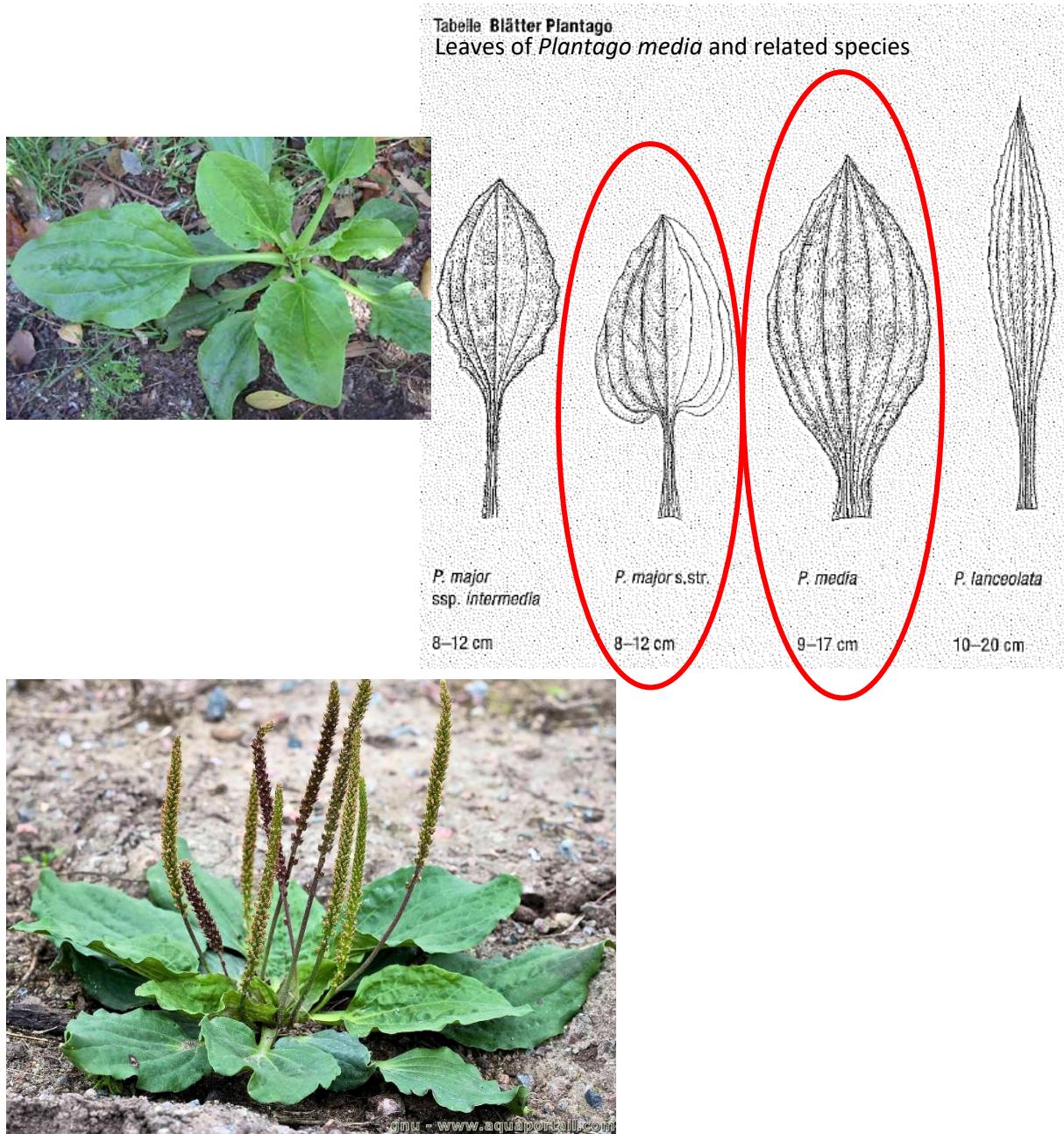
- Leaf blade much longer than stalk
- Leaves on the ground



Plantago media L. Mittlerer Wegerich;
20–40 cm; kollin–montan; Magerwiesen, Halb-
trockenrasen, meist auf Kalk (Mesobromion,
magere Arrhenatherion und Cynosurion);
eurosib; FH: 1647.

Invaders that look like *Plantago media*

Plantago major

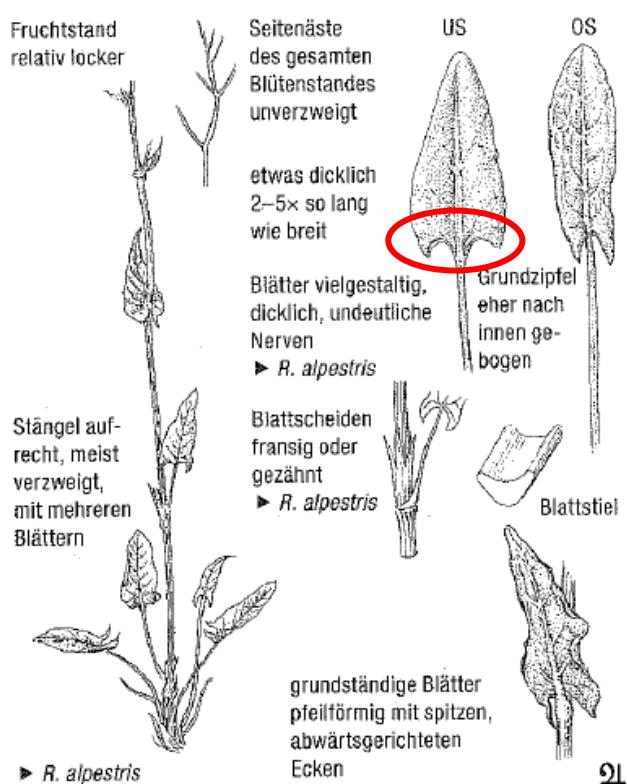


Rumex acetosa



Characteristics:

- Arrow-shaped leaves



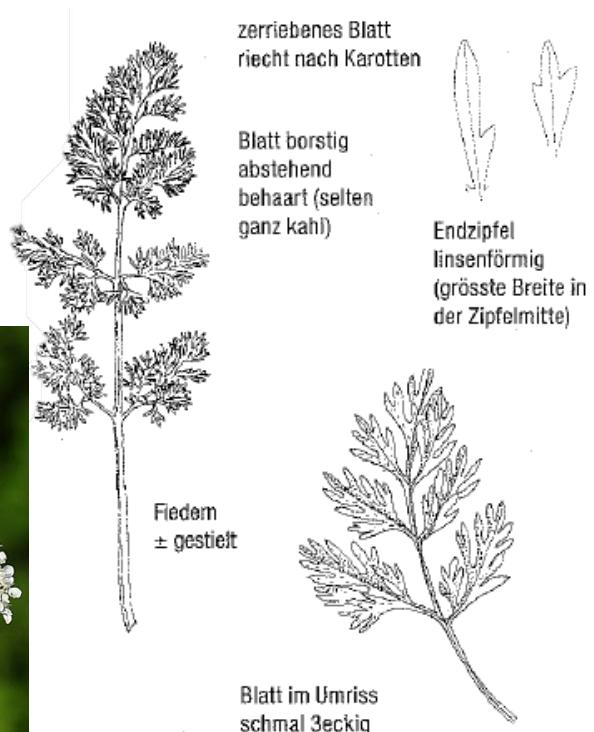
Rumex acetosa L., Wiesen-Sauerampfer;
30–100 cm; kollin–subalpin; Fettwiesen und
-weiden, Nasswiesen (Arrhenatherion, Molinion); Stickstoffzeiger; eurasiat;
FH: 1289.

Invaders that look like *Rumex acetosa*

Rumex obtusifolius



Daucus carota



► *Carum, Seseli, Orlaya*

⊖-⊖

Characteristics:

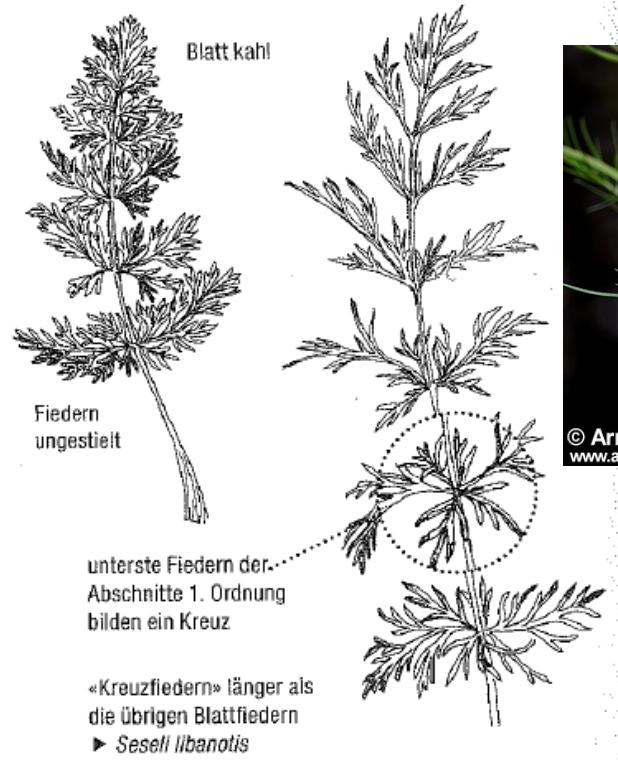
- Smells like carrot, if you crush a little of the leave



***Daucus carota* L.** Möhre; 30–60 cm; kollin–montan; magere Wiesen und Weiden, ruderal Pioniergesellschaften (Dauco–Melilotion, Mesobromion); formenreich; urspr. mediterran; FH: 1917.

Invaders that look like *Daucus carota*

Carum carvi



► *Daucus*, *Ligusticum*, *Seseli*



Carum carvi L. Wiesen-Kümmel; 30–50 cm; kollin–subalpin; Bergfettwiesen und -weiden (Polygono-Trisetion, Cynosurion); Nährstoffzeiger, sehr trittfest; eurasiat; FH: 1879.



Tripleurospermum inodorum



Characteristics:

- Leaves much finer than in *Daucus carota*

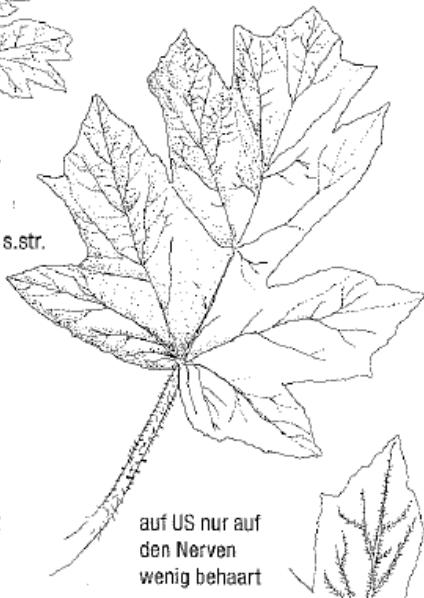
Heracleum sphondylium

Do not touch without gloves!



seitliche Abschnitte verwachsen, Mittellappen viel grösser als Seitenlappen

grössere Stängelblätter 3zählig, nie 5zählig
► *H. sphondylium* s.str.



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Characteristics:

- Hairs growing horizontally
- Sturdy plant



***Heracleum sphondylium* ssp. *elegans* Schübl. & G. Martens (*H. montanum*); Berg-Bärenklau; 50–120 cm; subalpin; Hochstaudenfluren und Rostseggenhalden (Adenostyilon, Caricion ferruginea); europ(mittel-süd); FH: 1903.**

Invaders that look like *Heracleum sphondylium*

Ranunculus acris



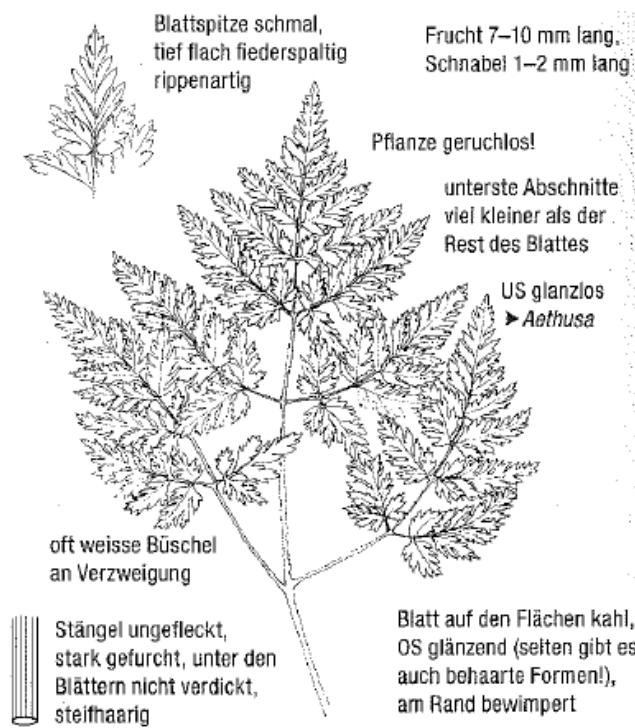
Characteristics:

- Hairs growing upwards

Geranium sp.



Anthriscus sylvestris



Characteristics:

- Triangular leaves



► *Chaerophyllum, Aethusa, Conium*

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***Anthriscus sylvestris* Hoffm. (*Chaerophyllum sylvestris*); Wiesen-Kerbel; 60–120 cm; kollin–subalpin; Fettwiesen, Hecken, Wegränder (Arrhenatherion, Aegopodion); europ; FH: 1831.**

Appendix

The most frequent invaders

Chenopodium polyspermum



Chenopodium album



Fun fact: tastes good





Polygonum sp.



Myosotis sp.



Cerastium fontanum



Conyza canadensis



Fun fact:
originally from
North America



Erigeron annuus



Fun fact: originally from North America, invasive neophyte

Fun fact: tastes good



Capsella bursa-pastoris



Barbarea vulgaris

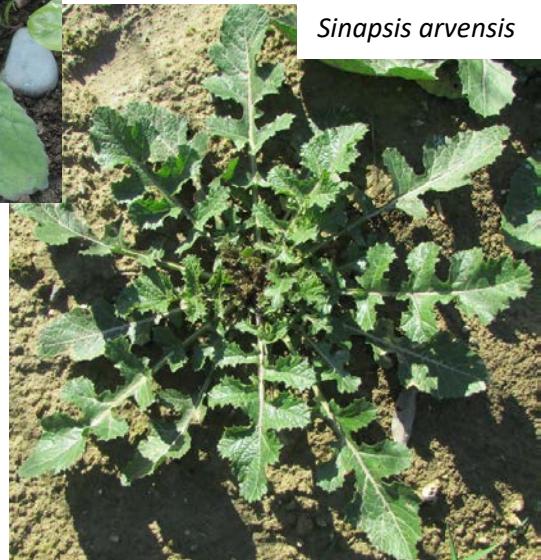


Brassica napus



Sinapis arvensis

Fun fact: young shoots can be used like broccoli





Fun fact: edible but not very tasty

Medicago lupulina



Veronica sp.



Lamium purpureum



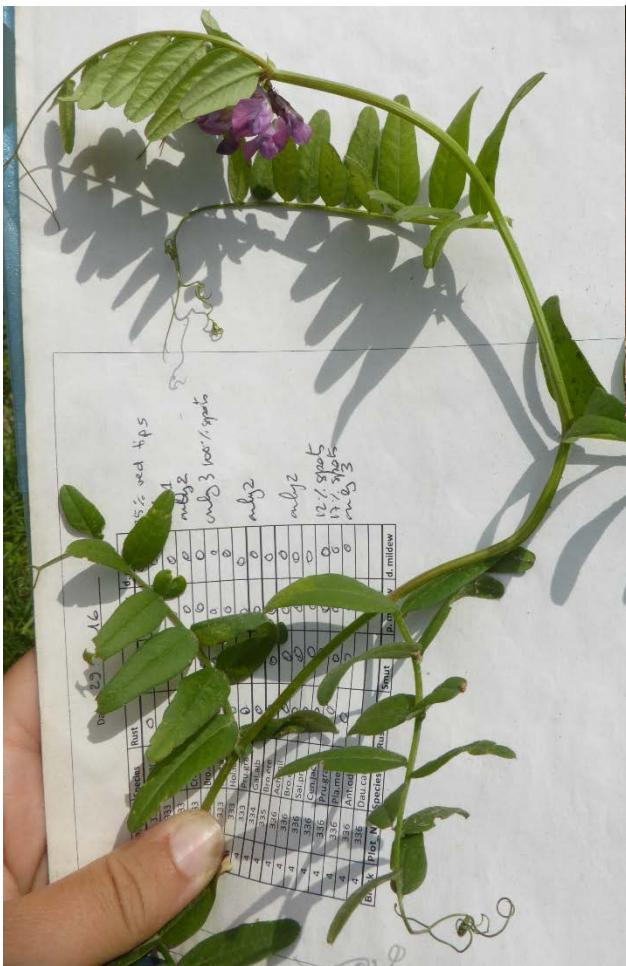
Leucanthemum vulgare



Viola sp.



Vicia sepium



Characteristics:

- Very long roots, make sure to remove everything with the help of a knife!

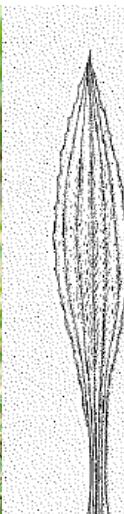
Fun fact: young shoots taste good

Lotus corniculatus



Plantago lanceolata

Fun fact: can be used in teas against coughing, the plant sap is good to put on itchy mosquito bites



Characteristics:

- Sometimes young seedlings can be mixed with grasses

10–20 cm

Tragopogon pratensis



Fun fact: flower buds taste good, but it has become a bit rare, so don't harvest it excessively



Characteristics:

- Grass like leaves
- White midrib

Echinochloa crus-galli



Characteristics:

- No ligule
- White midrib

Setaria viridis



© Peter Smith

Alopecurus pratensis



Phleum pratense



Silene vulgaris



Fun fact: young plants and flowers taste good



Rhinanthus alectorolophus



Fun fact: half parasite on grasses

Sanguisorba minor



Salad Burnet (*Sanguisorba minor*)

Jack Schepel ©2012 Floridata.com

Fun fact: tastes really good