An appeal for help with field sampling of the genus *Puccinellia* and some other halophytic taxa

Dear fellow botanists,

For a currently running collaborative research project dealing with the phylogeography and population genetics of the halophytic grass genus *Puccinellia* and some other halophytic plant species, I would like to ask you for help with expanding our sample collection. In order to achieve the intended aims of the project, we need to obtain as many population samples of the target species from all over the world as possible. In case of your willingness to help, contact me on my email address kur.pavel@gmail.com. Those interested in a deeper collaboration are also welcome.

Thank you in advance for spreading this appeal also among your colleagues. On behalf of the research team, Pavel Kúr (University of Vienna, Austria).

General instructions for sampling

- We need plants from both (semi-)natural (salt marshes, saline meadows etc.) and secondary (esp. roadsides) saline habitats, both coastal and inland.
- Ideally, we need plants in living state (for flow-cytometric measurements). So, if fast sending of living plants is feasible, the simplest approach is to just pack them and send them / have them delivered to us.
- In case of perennials with clonal growth (*Puccinellia*, *Plantago maritima*, *Carex secalina*), we prefer splitting each individual into two halves, pressing one half as a herbarium specimen and keeping the other half alive (in plastic bags or potted in flowerpots). This way the herbarium specimen will serve as a backup in case the living material does not survive the transport.
- If sending of living plants is too risky (too long delivery time), make herbarium specimens and put only small living parts of the plants into plastic bags.
- If possible, put another part of each plant to a silica-gel filled bag (ensuring fast desiccation and better DNA quality).
- In case of very tiny plants, rather do not split them, but instead send them in one piece (as living plants or herbarium specimens).
- Ideally sample around 20(–25) individuals per population.
- If uncertain about the plants' correct taxonomic identity, please collect them anyway.
- Also sample related taxa from taxonomically complicated groups (e.g., Cerastium glutinosum, Plantago major, Sonchus *arvensis) – we need them as well.
- If occurrence of mixed population is likely, sample more individuals than normally.
- We are also interested in samples of bryophytes from saline habitats (natural and secondary). Regardless of taxonomic determination, please collect multiple samples of bryophytes from such localities (simply put them to paper envelopes).
- Supply all sampling localities with exact geographic coordinates (WGS84 format), collection date, and a brief verbal description of the sampling site (type of habitat, list of accompanying species, phytosociological unit etc.)
- If possible, accompany all sampling localities with rich photographic documentation (details of the vegetation + surroundings of the locality etc.).
- Physical address for sending the collected plants:

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University of Vienna
Rennweg 14
1030 Wien
Austria

- All financial costs related to the field sampling and postage charges as well as other related expenses will be fully covered after an agreement.
- In case of a more involved cooperation, a co-authorship on the resulting publications can be granted.

Taxa to be sampled

Name	**Synonyms**	**Distribution (may not be exhaustive)**	**Preferred sampling phase (exact time depends strongly on geographic latitude and elevation)**
genus *Puccinellia*	*Atropis*, *Glyceria* p. par.	worldwide	flowering [±May]
Spergularia media	*S. maritima*, *S. marginata*	native to Europe, introduced to other continents	ripening [summer–autumn]
Spergularia marina	*S. salina*		
Plantago maritima		Eurasia	flowering [±June]
Plantago winteri	*P. major* subsp. *winteri*, *P. major* var. *salina*	Europe	ripening [late summer–autumn]
Lotus tenuis		Eurasia	flowering or ripening [summer–autumn]
Juncus ranarius		Eurasia	ripening [late summer–autumn]
Atriplex prostrata	*A. hastata*	native to Eurasia, introduced worldwide	ripening [late summer–autumn]
Atriplex littoralis agg.		native to Eurasia, introduced to North America	ripening [late summer–autumn]
Cerastium subtetrandrum	*C. pumilum* f. *subtetrandrum*, *C. diffusum* subsp. *subtetrandrum*	Europe	flowering or ripening [(March–)April–May(–June)]
Limonium gmelini		Eurasia	flowering [autumn]
Trifolium fragiferum		Eurasia	flowering [summer–autumn]
Carex secalina		Eurasia	late flowering or ripening [summer–autumn]
Sonchus arvensis subsp. *uliginosus*	*S. uliginosus*	native to Eurasia, introduced to North America	flowering [summer–autumn]
Bryophytes	Collect multiple samples of bryophytes from various microhabitats within a locality. Pack them in paper envelopes and send (no other special treatment needed). Interesting halophytic bryophytes tend to be very small species – look closely. They prefer bare wet soil.		

Brief overview of particular taxa

Genus *Puccinellia*

- we are interested in all halophytic representatives of the genus
- in Central Europe we focus on *P*. *distans* agg. group (*P*. *capillaris*, *P*. *distans*, *P*. *limosa*, and *P*. *peisonis*)
- however, we need some samples of all the other species for comparison purposes as well
- *main discriminatory characters*:
  spikelets multi-flowered (× *Agrostis* – one-flowered), with rounded edges (× *Poa* – glumes keeled); ligule present (× *Eragrostis* – ligule absent); leaf sheaths open (× *Glyceria* – sheaths closed)

ligule

spikelets

P. maritima

P. limosa

habitus

Spergularia media, *S. marina*

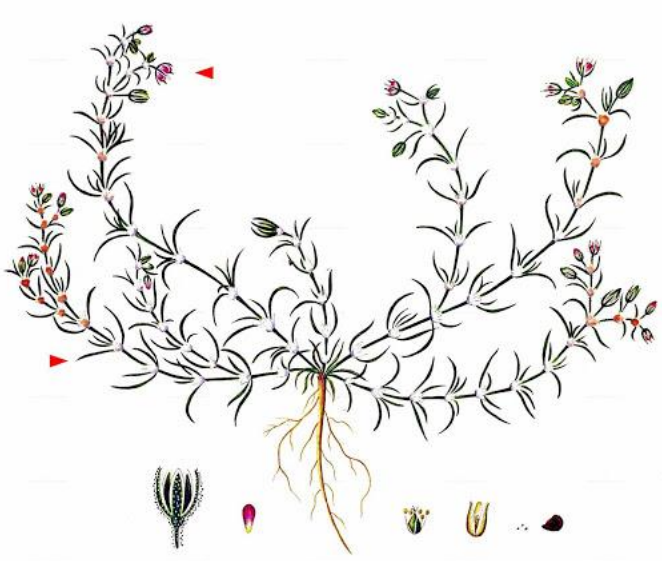
- *main discriminatory characters*:
  plants bright green, leaves somewhat succulent; calyx with five dark spots (glands) at the base; stipules short (less than 2× longer than wide), typically connate at the base; seeds nearly smooth, some winged (esp. *S. media*)

S. media *S. marina*
stipules, seeds

dark glands on calyx

S. marina – flower

S. media – flower



Spergularia – habitus

Plantago maritima

- *main discriminatory characters*:
  leaves thick, bright green, succulent, leaf margin smooth; plants perennial with branched rhizome, forming tussocks
- possible misdeterminations:
  P. coronopus – has serrate leaves; annual species; heavily spreads along roadsides in Europe

P. coronopus – **do not sample**

P. maritima – habitus

P. maritima – leaves

P. maritima – inflorescence

Plantago winteri

- spurious taxon from the *P*. *major* agg. group
- do not hesitate to sample even if unsure about correct determination
- also sample other representatives of the *P*. *major* group (*P*. *major*, *P*. *uliginosa*)
- *main discriminatory characters*:
  leaves thick, succulent; leaf blade 3-veined, dark green or reddish, max. 1.5× longer than wide, ±smooth margin

leaves

habitus

Lotus tenuis

- *main discriminatory characters*:
  leaves conspicuously narrow (5–8× longer than wide)

inflorescence

leaves

habitus

Juncus ranarius

- belongs to the complicated *J. bufonius* agg. group
- determination very difficult – sample even if you are not sure
- *main discriminatory characters*:
  valves of ripe capsules typically curved inwards; plants usually reddish at the base

habitus

stem base

capsule

Atriplex littoralis agg.

- *main discriminatory characters*:
  all leaves (even bottom ones) linear, narrow, with smooth edge (max. weekly lobate)
- the aggregate includes *A*. *littoralis* s. str. (coastal species) and recently described *A*. *intracontinentalis* (inland) – sample both

habitus

inflorescence + leaves

Atriplex prostrata

- *main discriminatory characters*:
  leaves hastate

leaf

habitus

Cerastium subtetrandrum

- overlooked halophytic species morphologically most similar to *C. glutinosum*
- *main discriminatory characters*:
  C. glutinosum agg.: spring annuals; calyx with short hairs (not exceeding the tips); lowest bracts green or with only a short scarious tip; lowest stem internode without glandular hairs
  C. subtetrandrum: *some* flowers tetramerous; lowest bracts without scarious tip (whole green); ripening capsules reddish

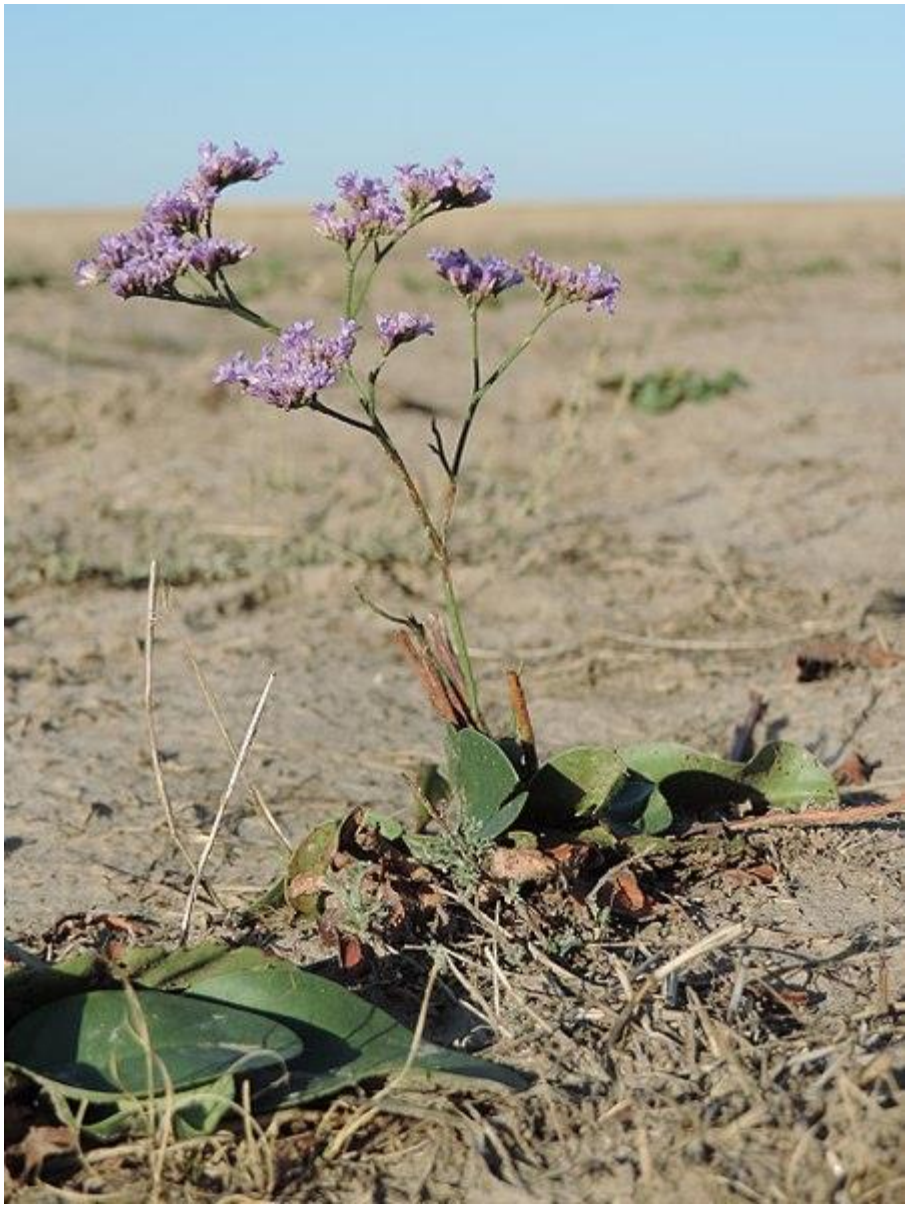
C. glutinosum – inflorescence

C. glutinosum – flower

C. subtetrandrum

Limonium gmelini

- *main discriminatory characters*:
  basal leaves whole, with smooth margin; plants of inland salt marshes
- genus *Limonium* is very complicated – do not loose time with species determination, just sample any plants from saline habitats



habitus

secondary habitat at roadside

Trifolium fragiferum

- *main discriminatory characters*:
  overblown (ripe) flowers with conspicuously inflated calyx

overblown inflorescences

flowering inflorescences

Carex secalina

- *main discriminatory characters*:
  male and female spikelets separate (heterostachyous species); plants form dense tussocks

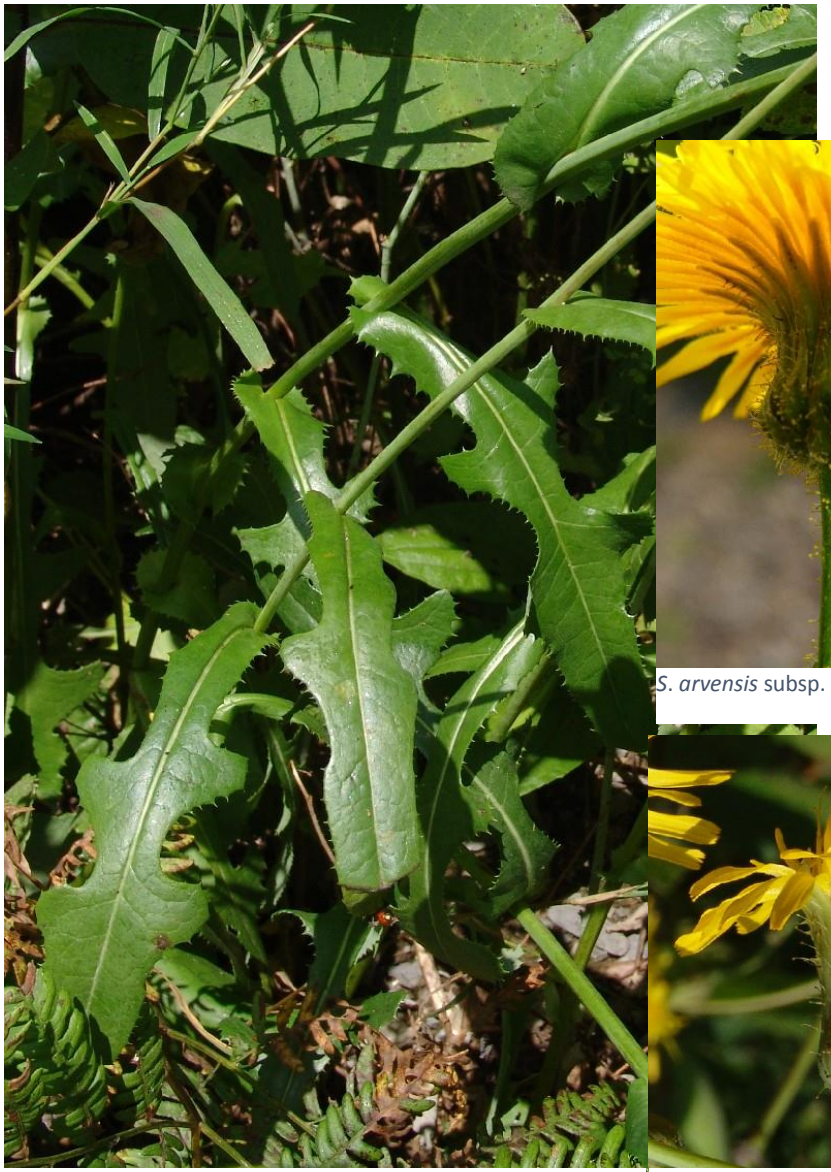
habitus

spikelets

Sonchus arvensis subsp. *uliginosus*

- *main discriminatory characters*:
  S. arvensis: plants perennial, with creeping rhizome; leaf auricles rounded
  S. arvensis subsp. *arvensis*: involucres densely covered with glandular hairs
  S. arvensis subsp. *uliginosus*: involucres only sparsely covered with glandular hairs

habitus



leaves

S. arvensis subsp. *arvensis* – involucre

S. arvensis subsp. *uliginosus* – involucre