

Kuhn T. & Ruprecht E. (2023) Niche breadth and overlap of pseudogamous apomictic *Crataegus* hybrids and their progenitors in north-western Romania. – *Preslia* 95: 447–474.

**Supplementary Table S3:** Characterization of the ten vegetation clusters obtained using divisive hierarchical clustering and the Gap-statistical method, presented in Figure 6 (Characteristic species of the clusters were listed using indicator species analysis through the ‘multipatt’ function and the ‘indVal.g’ association index from the ‘indicspecies’-package in R; De Caceres, M. and Legendre, P. (2009). Plant nomenclature follows EURO+MED (2023) online database).

Cluster	study regions	ecosystem	<i>Crataegus</i> taxa	Characteristic species of the vegetation
Cluster1	continental-fragmented	forest (ecotone)	<i>Crataegus rhipidophylla</i> , <i>C. lindmanii</i> , <i>C. × subsphaerica</i> , <i>C. monogyna</i> , <i>C. laevigata</i> , <i>C. × macrocarpa</i> , <i>C. × hadensis</i>	<i>Quercus cerris</i> , <i>Lathyrus niger</i> , <i>Melittis melissophyllum</i> , <i>Carex michelii</i> , <i>Dactylis polygama</i> , <i>Brachypodium sylvaticum</i> , <i>Ligustrum vulgare</i> , <i>Potentilla alba</i> , <i>Viola reichenbachiana</i> , <i>Cruciata glabra</i> , <i>Convallaria majalis</i> , <i>Campanula rapunculoides</i> , <i>Poa nemoralis</i> , <i>Lathyrus vernus</i> , <i>Melica nutans</i> , <i>Sedum telephium</i> , <i>Calamagrostis arundinacea</i>
Cluster2	suboceanic-forested	forest, ecotone	<i>Crataegus laevigata</i> , <i>C. × subsphaerica</i> , <i>C. rhipidophylla</i> , <i>C. × macrocarpa</i> , <i>C. palmstruchii</i> , <i>C. monogyna</i>	<i>Quercus frainetto</i> , <i>Lapsana communis</i> , <i>Juniperus communis</i> , <i>Quercus cerris</i> , <i>Melampyrum cristatum</i> , <i>Centaurea nigrescens</i> , <i>Quercus petraea</i> , <i>Festuca gigantea</i> , <i>Hieracium bauchinii</i>
Cluster3	suboceanic-forested, condinental-fragmented	forest (ecotone)	<i>Crataegus rhipidophylla</i> , <i>C. laevigata</i> , <i>C. lindmanii</i> , <i>C. × subsphaerica</i> , <i>C. × macrocarpa</i> , <i>C. monogyna</i> , <i>C. × hadensis</i>	<i>Quercus petraea</i> , <i>Tilia cordata</i> , <i>Euonymys verrucosus</i> , <i>Galium schultesii</i> , <i>Mycelis muralis</i>

Cluster4	suboceanic-fragmented (suboceanic-forested)	forest, ecotone	<i>Crataegus</i> × <i>subsphaerica</i> , <i>C. laevigata</i> , <i>C. rhipidophylla</i> , <i>C. monogyna</i> , <i>C. × media</i> , <i>C. × macrocarpa</i>	<i>Acer campestre</i> , <i>Geum urbanum</i> , <i>Fraxinus excelsior</i> , <i>Galium aparine</i> , <i>Quercus robur</i> , <i>Hedera helix</i> , <i>Stellaria media</i> , <i>Poa trivialis</i> , <i>Fagopyrum esculentum</i> , <i>Ulmus minor</i> , <i>Pulmonaria officinalis</i> , <i>Scilla vindobonensis</i> , <i>Ficaria verna</i> , <i>Carex divulsa</i> , <i>Myosotis sparsiflora</i>
Cluster5	suboceanic-fragmented	grassland, ecotone	<i>Crataegus</i> × <i>subsphaerica</i> , <i>C. monogyna</i>	<i>Quercus robur</i> , <i>Cornus sanguinea</i> , <i>Prunus spinosa</i> , <i>Salix fragilis</i> , <i>Acer tatarica</i> , <i>Festuca pseudovina</i>
Cluster6	continental-fragmented, suboceanic-forested	grassland, ecotone	<i>Crataegus</i> × <i>subsphaerica</i> , <i>C. monogyna</i> , <i>C. rhipidophylla</i> , <i>C. lindmanii</i> , <i>C. × media</i> , <i>C. × hadensis</i> , <i>C. × kyrstostyla</i> , <i>C. × macrocarpa</i>	<i>Agrostis capillaris</i> , <i>Brachypodium pinnatum</i> , <i>Filipendula vulgaris</i> , <i>Stachys officinalis</i> , <i>Centaurea phrygia</i> , <i>Trisetum flavescens</i> , <i>Briza media</i> , <i>Daucus carota</i> , <i>Knautia arvensis</i> , <i>Dorycnium pentaphyllum</i> , <i>Cynosurus cristatus</i>
Cluster7	suboceanic-forested, continental-open, continental-fragmented	grassland	<i>Crataegus</i> × <i>subsphaerica</i> , <i>C. monogyna</i> , <i>C. × media</i> , <i>C. × macrocarpa</i> , <i>C. monogyna</i>	<i>Lolium perenne</i> , <i>Scabiosa ochroleuca</i> , <i>Convolvulus arvensis</i> , <i>Agrimonia eupatoria</i> , <i>Salvia verticillata</i> , <i>Medicago falcata</i> , <i>Lappula squarrosa</i> , <i>Lotus corniculatus</i> , <i>Achillea millefolium</i> , <i>Artemisia campestris</i> , <i>Torilis arvensis</i> , <i>Poa compressa</i>
Cluster8	continental-open, continental-fragmented, suboceanic-forested	grassland (ecotone)	<i>Crataegus</i> × <i>subsphaerica</i> , <i>C. monogyna</i> , <i>C. × media</i> , <i>C. × rhipidophylla</i> , <i>C. × hadensis</i> , <i>C. lindmanii</i> , <i>C. × kyrstostyla</i>	<i>Teucrium chamaedrys</i> , <i>Bothriochloa ischaemum</i> , <i>Thymus pannonicus</i> , <i>Stipa capillata</i> , <i>Euphorbia cyparissias</i> , <i>Festuca rupicola</i> , <i>Koeleria macrantha</i> , <i>Fragaria viridis</i> , <i>Asperula cynanchica</i> , <i>Potentilla cinerea</i> , <i>Elytrigia intermedia</i> , <i>Stachys recta</i>

Cluster9	suboceanic-fragmented, continental-fragmented, (suboceanic-forested)	grassland	<i>Crataegus</i> × <i>subsphaerica</i> , <i>C. monogyna</i> , <i>C. × media</i>	<i>Elytrigia repens</i> , <i>Ambrosia artemisiifolia</i> , <i>Setaria pumila</i> , <i>Sorghum halepense</i> , <i>Cichorium intybus</i> , <i>Xanthium italicum</i> , <i>Dactylis glomerata</i> , <i>Polygonum avicularis</i> , <i>Humulus lupulus</i> , <i>Conium maculatum</i> , <i>Erigeron canadensis</i> , <i>Pastinaca sativa</i> , <i>Urtica dioica</i> , <i>Mentha longifolia</i> , <i>Odontites vulgaris</i>
Cluster10	suboceanic-fragmented	grassland (ecotone)	<i>Crataegus</i> × <i>subsphaerica</i> , <i>C. monogyna</i> , <i>C. rhipidophylla</i> , <i>C. laevigata</i> , <i>C. × media</i>	<i>Poa angustifolia</i> , <i>Geranium molle</i> , <i>Vicia angustifolia</i> , <i>Alopecurus pratensis</i> , <i>Stellaria graminea</i> , <i>Veronica chamaedrys</i> , <i>Veronica arvensis</i> , <i>Cerastium fontanum</i> , <i>Festuca valesiaca</i> , <i>Hordeum murinum</i> , <i>Ranunculus polyanthemos</i> , <i>Vicia hirsuta</i> , <i>Capsella bursa-pastoris</i> , <i>Cynodon dactylon</i> , <i>Anthoxatnum odoratum</i> , <i>Vicia grandiflora</i> , <i>Trifolium repens</i> , <i>Taraxacum officinale</i> , <i>Carex pairae</i> , <i>Carex praecox</i> , <i>Myosotis arvensis</i> , <i>Thymus glabrescens</i> , <i>Plantago lanceolata</i> , <i>Ranunculus repens</i> , <i>Galium verum</i> , <i>Potentilla cinerea</i> , <i>Festuca pratensis</i> , <i>Carex hirta</i>

## References

De Caceres, M., Legendre, P. (2009) Associations between species and groups of sites: indices and statistical inference. - *Ecology*, URL <http://sites.google.com/site/miqueldecaceres/>

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