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TAXONOMY, CHOROLOGY, ECOLOGY AND COENOLOGY OF THE *ALCHEMILLA MONTICOLA* SPECIES

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ABSTRACT

For some polymorphic genera, such as *Alchemilla* (Fam. Rosaceae), widespread over large areas, it can be said that the taxonomy of species is difficult. Therefore, the aim was to know the *Alchemilla* species from the Romanian Carpathians in all aspects, in relation to the complex researches that are carried out from a taxonomic point of view at European level. The species *Alchemilla monticola*, presented in this paper, is thoroughly analyzed from the taxonomic, ecologic, chorologic, coenologic and even plantlet points of view. New additions have been made in respect of the chorology of this taxon in the Romanian Carpathians.

INTRODUCTION

The *Alchemilla* genus comprises over 1,000 species worldwide (Izmailow, 1981). The current species are apomictic, in their vast majority, whence the large number of species. Taxonomic research on genera with polymorphic species, such as the genus *Alchemilla*, has been shown to be necessary. Often the identification of some species is difficult, and the histo-anatomical, ecological, spreading area must be added to the morphological characters. All these data are necessary to complete the recognition characters in order to more precisely delimit some species.

In this sense, *Alchemilla monticola*, a microspecies that emerged from the aggregate species *A. vulgaris* L., present in the Romanian Carpathians, is analyzed in detail.

MATERIAL AND METHOD

The researches on the species of the *Alchemilla* genus were carried out on the itinerary in the Romanian Carpathians. In the identified *Alchemilla* species, including *A. monticola*, complex ecological, phytocenological seasonal observations were made, but also on the plantlet. The ecology is presented either on the basis of speciality literature data but also on the personal observations over the itinerary research of the species. The chorology is accomplished on the map type Atlas Florae Europaeae, with tetrathes of 50 x 50 km, using the indexes U.T.M. (Universal Transverse Mercator) transformed (Lehrer & Lehrer 1990). After consulting the main Herbariums from the country (BUCA, BUAG, BUCF, CRAI, HBV, CL, I, IAGB, SIB) there have been verified the herbarium materials and corrected the possible errors of identification. For Herbariums, there were used the abbreviations according to Index herbariorum (P. K. Holmgren 1990). The authors of the species are written according to the present standards (Brummit & Powell 1992).

RESULTS AND DISCUSSIONS

Alchemilla monticola Opiz 1838, in Opiz et Berchtold, Oekon.-Techn. Fl. Böhm. 2(1): 13.

Syn.: - *A. pastoralis* Buser 1891, Not. Alchim.: 18; - *A. vulgaris* L. sensu Buser post a. 1894; - *A. vulgaris* L. subsp. *silvestris* (F. W. Schmidt) Camus 1900, in Rouy et Camus, Fl. France 6: 456 p. p.; - *A. vulgaris* L. subsp. *eu-vulgaris* Asch. et Graebn. var. *silvestris* (F.

W. Schmidt) Asch. et Graebn. subvar. *pastoralis* (Buser) Asch. et Graebn. 1902, Syn. 6: 407; - *A. pratensis* F. W. Schmidt var. *vulgaris* (L.) Schinz et Keller 1900, Fl. Schweiz: 256; - *A. pascualis* Fröhner 1964, Ber. Bayer. Bot. Ges. 37: 103, non Juz.; - *A. vulgaris* L. subsp. *pastoralis* (Buser) Palitz l. c., in A. Buia 1956, Fl. Rep. Pop. Române 4: 697.

Description: Plant (fig. 1a) of medium size, rarely large, 20-50 cm tall, quite robust, dark green-bluish in color, slightly reddish brown to autumn. Creeping rhizome, at most slightly lignified, up to 10 mm thick. Stems ascending or erect, rigid, starting laterally from the axils of the basal leaves, 1-3 mm thick, to inflorescence \pm densely hairy patent (often only scattered in the inflorescence). Basal leaves (fig. 1b) with orbicular lamina, flat to wrinkled, sometimes slightly funnel-shaped, (2) 4-11 (14) cm wide, on both sides \pm densely hairy, the main ribs abaxial along the entire hairy length, on the side their basal hairs with horizontal patents or \pm retrors. Adaxially, the lamina is greenish-gray to dark green. Basal sinus almost closed. The lamina is lobed up to 1/5-1/3 (1/2) in 7-9 (11) semi-ovate, suborbicular, semi-elliptical or usually triangular lobes, most often uniformly rounded, up to twice as long as wide, with short sinuses between them (1-4 mm undented). Distinct marginal lobes. Medium lobe with (11) 13-19 (24) equal teeth, 1-2,5 mm long, 0,7-3,5 mm wide, semi-ovate to elongate ovate or nearly obovate, as long as wide, narrow to triangular curved, subacute. The petioles of the leaves are 1,5-2,5 mm thick, green, densely hairy, with perpendicular-patent hairs. Petioles of hairy spring leaves. Membrane stipules, elongated, colorless, 15-40 mm long, most often densely hairy at least on the main rib, the ears usually irregularly lobed and toothed (up to 10 teeth). Stem leaves short petiolate or sessile, smaller, almost digitally lobed. Inflorescence 5-10 cm wide, with dense glomeruli, green flowers, type 4, rarely apical flowers type 5. Flowers (fig. 1 c) (1,5) 2-3,5 mm long and (2) 2,5-4 mm wide. Flower pedicels in postanthesis 0,5-1 (3,5) mm long, glabrous, rarely on the outer flowers in the inflorescence at the base of the hair, at the lower flowers sometimes along the entire length of the hair. Hypanthiums \pm hairy, often glabrous or nearly glabrous, mature elliptical to spherical, at the apex most often slightly narrowed, at the base rounded to sharp. Triangular to semi-ovate sepals, obtuse to acute, glabrous to densely hairy on the outside, as long or shorter than the hypanthium, in the postanthesis slightly apart, slightly extended to erect. The episepals ovate, obtuse, usually with bristles at the edge, sometimes glabrous, generally shorter and obviously narrower than the sepals. The style exceeds the nectariferous disc by 0,3-0,8 mm. The achene is equal to the hypanthium or sometimes exerts from the disc about 25% of its length. Number of chromosomes $2n = 101-110$. -VI – VIII.

The plantlet has opposite cotyledons, petiolate, glabrous, with a circular-elliptical lamina. The prothylus has a 5-lobed lamina, with lobes as simple as teeth. Petiole with sparse, patent hairs. The next leaf has a 5-lobed limb, with five obvious ribs at the base, the petiole with patent hairs.

Taxonomic specifications: *A. monticola* is a microspecies that has become detached from the aggregate species *A. vulgaris* L. In the Romanian botanical literature it is mentioned either under *A. pastoralis* Buser (Prodan 1923: 578, Borza 1947: 145), *A. vulgaris* L. subsp. *pastoralis* (Buser) Palitz (Buia 1956: 697), or as *A. monticola* Opiz (Beldie 1977: 265, Ciocârlan 2009: 327, Sârbu et al. 2013: 254).

In drier places, grasslands on relatively nutrient-poor soils, *A. monticola* specimens remain quite small and could be confused with *A. glaucescens* Wallr., which is different from densely hairy pedicels. In *A. monticola*, the pedicels of the flowers are glabrous, sometimes with isolated hairs on the pedicels. It could also be confused with *A. crinita* Buser, which is distinguished by its orbicular leaves with an almost closed basal sinus, lobes with fairly uniform teeth, and the hypanthium, which is sometimes hairy.



a



b

c

Fig. 1. *A. monticola*: a - general aspect, b - basal leaves, c – inflorescence detail (a -c, orig.)

Ecology: Grows in meadows, thickets, weeds, sparse and forest edges, on moderately dry to moist soils (rarely in swamps or along streams), shallow on stony substrate, on semi-fixed rubble, rich in limestone and bases, weakly acidic, often rich in nitrogenous substances. It is one of the few flowering plants found on bare ground. Mesotrophic-eutrophic. Mesothermal-microthermal. Mesophilic-mesoxerophilic.

Chorology: Frequency from beech floor to lower alpine. In the Romanian Carpathians it is known from the following points (fig. 2):

AB: between Abrud and Câmpeni (Buia 1956: 697) - FS 4.

AG: Sasului Hill, experimental lot, G. Dihoru [BUCA 58.649] - LL 4; Argeș Region, Câmpulung district, Podu Dâmboviței locality, „Sasului Hill”, in the meadow, alt. 1,100 – 1,250 m, 5.VI.1963, V. Ciocârlan, G. Turcu, E. Baciú and L. Stan under *A. vulgaris* L., revised V. Ciocârlan 1996 [BUAG 22.509] - LL 4.

BC: Bacău County, Oituz Pass, on the side of the road, alt. about 1,000 m, 20.V.2007, Violeta Boruz [CRAI] - MM 4; The meadows – Bolovăniș, Răchitiș, 6.07.2019, Violeta Boruz [CRAI] – MM1.

BH: „Crișana, distr. Bihor, Vallis ladului. In pratis mesophilis montanis ad „Dealul Mare”, 23.VI.1977, I. Gergely et Șt. Șuteu” under *A. acutiloba* Opiz, revised A. Plocek 1990

[CL 63.692] - FS 1; „Crișana, distr. Bihor, in graminosis mesophilis Stat. climat. Stâna de Vale, 10.VI.1964, O. Rațiu” under *A. hybrida* (L.) Mill., revised A. Plocek 1990 [CL 613.024]; Bihor, Stâna de Vale, alt. 1,100 m, 17.VII.1935, Veturia and Al. Borza under *A. silvestris* Schm., revised A. Plocek 1990 [CL 448.684]; Apuseni Mountains, Valea Iadului, Stâna de Vale, 24 - 27.V.2001, leg. G. Popescu, I. Costache, D. Răduțoiu, det. Violeta Boruz [CRAI] - FS 1.

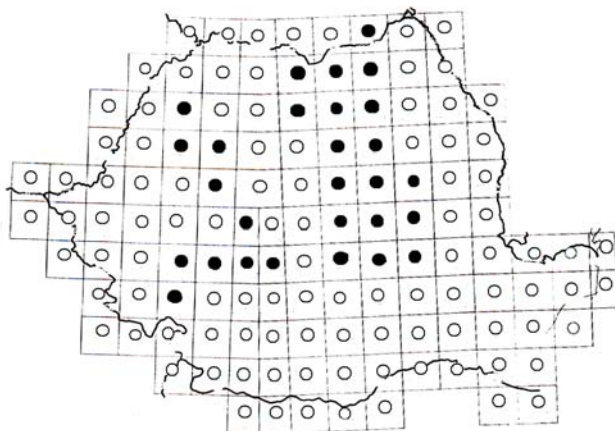


Fig. 2. The chorology of *A. monticola* species in Romania (orig.)

BN: „Mt. Țibleș (Buia 1956: 697) - LN 1, LN 3; Distr. Năsăud, Montes Rodnenses. In rup. Calc. Merid. Orient., Mt. Negriasa, alt. 1700 m.s.m., 28.VII.1948, Antonius Nyárády et pater” under *A. palmata* Gilib. var. *pastoralis* (Buser) A. et G., revised Violeta Boruz 2007 [SIB 147.255] - LN 1; „In monte Korongyis montibus Rodnensis, alt. cca. 1600 m.s.m., 14.VIII.1907, E. I. Nyárády” under *A. silvestris* Schm., revised Violeta Boruz 2007 [SIB 147.308] - LN 1; Năsăud, to the train station, 4.V.1956, leg. et det. Bârlea under *A. hybrida* L. em. Mill., revised M. Danciu [HBV 001.455] - LN 2; „Montes Radnenses. In pratis silvaticis jugi montium inter col. Lusca - Cristi et pagum Párva, alt. cca. 850 m.s.m., 17.VI.1943, Antonius et E. I. Nyárády” under *A. vulgaris* L. subsp. *monticola*, revised A. Plocek 1990 [CL 202.754] - LN 1; „Montes Radnenses Transsilvaniae. In pratis montanis jugi montis Benes supra pagum Óradna, alt. cca. 1300 m.s.m., 15.VI.1941, leg. Hargitai - Nyárády A., det. Soó” under *A. vulgaris* L. subsp. *monticola* Opiz, revised A. Plocek 1990 [CL 201.753] - LN 1.

BV: Homorod Baths, r. Rupea (Buia 1956: 697) - LL 3/LM 4; The city of Stalin (Buia 1956: 697) - LL 3; Piatra Craiului Mountain (Buia 1956: 697, Simona Mihăilescu 2001: 64) - LL 4; Predeal on the Râșnoava Valley (Buia 1956: 697) - LL 4; Predeal, elevation 1400, through the mountain pastures, 11.VI.1964, V. Ciocârlan under *A. vulgaris* L. subsp. *pratensis* Schm., revised Violeta Boruz 2006 [IAGB 13.258] - LL 4; „Brașov, in monte Postăvaru, solo calc., alt. 1600 -1650 m.s.m., 23.VIII.1961, E. I. Nyárády” under *A. silvestris* Schm. (*A. palmata* Gilib. var. *pastoralis* Buser), revised Violeta Boruz 2007 [CL 614.480] - LL 3; Postăvaru Mountain, at the Stone Gates, 11.IX.1985, M. Danciu [HBV 062.334] - LL 3; Stalin Region, Codlea district, Moieciu locality, in pasture, alt. about 1,400 m, 30.V.1967, V. Ciocârlan and I. Molea under *A. vulgaris* L., revised V. Ciocârlan 1998 [BUAG 14.578] - LL 4; „Piatra Mare - Șura de Piatră”, 8.VI.1954, M. Ciucă under *A. flabellata* Buser, revised M. Danciu [HBV 001.429] - LL 3; Piatra Mare, June 1900, Römer under *A. montana* Willd., revised M. Danciu [HBV 001.561] - LL 3; Piatra Craiului Mountain, south face, July 1948 and at Crack, 20.VII.1949, A. Beldie [BUCF 1656, 1655]; Piatra Craiului, under Grohotișul Mare, near the Garofița Pietrii Craiului chalet, 27.VIII.2004, M. Danciu [HBV 064.044]; Piatra

Craiuului, in alpine meadows, 4.VII.1980, I. Morariu and Pant. Ularu under *A. vulgaris* L. subsp. *pastoralis* (Buser) Palitz, revised M. Danciu [HBV 001.533] - LL 3.

BZ: Penteleu, 20.VIII.1934, leg. A. Haralamb, det. J. Neuwirth [BUCF 1710]; The Penteleu Massif: „Fundul Milei, Viforâta” (Șerbănescu 1939 under *A. vulgaris* L. subsp. *palmata* (Gilib.) Gams) -ML 4; Siriu Mountain (Dihoru 1975: 44); Buzău, Siriu Mountain, „Cura muntelui”, G. Dihoru [BUCA 147.637], [BUCA 147.628] - ML 2.

CJ: Ciucea - FT 2, Huedin district (Buia 1956: 697) - FS 3; Vlădeasa Mountains, Pietrele Albe, alt. 1,550 m.s.m., 10.VI.1955, I. Resmeriță under *A. vulgaris* L. subsp. *pastoralis* (Buser) Palitz, revised A. Plocek 1990 [CL 614.112] - FS 1; Vlădeasa Massif, „Valea Seacă” (Resmeriță 1970: 55 under *A. vulgaris* L. subsp. *pastoralis* (Buser) Palitz) - FS 1; Transilvania, distr. Cluj –Grassy places on the hill „Horaiața” near Călata locality, alt. cca. 600 - 700 m.s.m., 13.V.1950, V. Soran under *A. plicata* Buser, revised A. Plocek 1990 [CL 214.961] - FS 3.

CV: „Întorsura Buzăului”, leg. ? [BUCA 131.266] - ML 1; Ozunca Bath, 20.VI.1968, M. Danciu under *A. vulgaris* L., revised M. Danciu under *A. acutiloba* Opiz, Violeta Boruz 2007 under *A. monticola* Opiz [HBV 001.522] - ML 1; „Comit. Háromszék, in pratis montanis decl. Mt. Papolci-höztető cca. 1200 supra pagum Papolc, 6.VIII.1943, Hargitai” under *A. hybrida* (L.) Mill. subsp. *plicata* Buser, revised A. Plocek 1990 [CL 594.079] - ML 1.

GJ: Gilortului Valley (Pócs 1962: 92); in the forest cut on Râncea Mountain, alt. 1,500 m, 9.VII.1997, leg. G. Popescu, I. Costache, D. Răduțoiu, det. Violeta Boruz [CRAI] - GR 2; „Oltenia, distr. Mehedinți, in graminosis saxosisque montis Oslea, supra pagum Tismana, alt. cca. 1700 m.s.m., solo calc., 24.VII.1928, E. I. Nyárády” under *A. silvestris* Schm., revised A. Plocek 1990 [CL 156.785] - FQ 1.

HD: Retezat Mountains on Galbina (Buia 1956: 697) - FR 2; „Transsilvania, distr. Hunedoara. In pratis subalpinis ad Albele, adversus montes Retezat, 2.VIII.1948, Șt. Csűrös” under *A. hybrida* (L.) Mill., revised A. Plocek 1990 [CL 562.724]; „Transsilvania, distr. Hunedoara, Montibus Retezat in Mt. Piatra Iorgovanului, 5.IX.1985, G. Groza” under *A. hybrida* (L.) Mill., revised A. Plocek 1990 [CL 647.358]; Retezat Mountains: Dobruna in the beech, Custura, Valereasca (E. I. Nyárády 1958: 143 under *A. palmata* Gilib.) - FR 2; Retezat Mountains: Lăpușnicului Mare Valley, Poiana Pelegii 6.07.2020, Violeta Boruz [CRAI]; Parâng Mountains: „Mândra, Căldarea Roșiile, Cârja, V. Găuri, Căldarea Coasta lui Rus, Stâna Găuri, Vf. Parâng, Stâna Ciobanul, Mt. Badea, Valea Jiului la Lainici, Valea Jiețului, Valea Lotrului, Mt. Ciobanul, Stâna Teapa” (Pócs 1962: 92); Parâng Mountains, Groapa Seacă, forest road, alt. about 1,580 m, 10.X.2004, Violeta Boruz [CRAI] - FR 4; Hunedoara County, Parâng Mountains, between Groapa Seacă Pass and Zănoaga Sliveiului, on the roadin the spruce forest, alt. about 1,700 m, 8.X.2006, Violeta Boruz [CRAI]; Hunedoara County, Parâng Mountains, „Coasta lui Rus”, in the meadow, alt. about 1,945 m, 4.VIII.2006, Violeta Boruz [CRAI]; Vâlcan Mountains: Straja, near the Cross of Heroes, weeds, alt. about 1,400 m, 25.VIII.2004, Violeta Boruz [CRAI]; Straja Mountain, in meadow on the Piatra Vindereului Peak, alt. about 1,750 m, 25.VIII.2004, Violeta Boruz [CRAI]; Straja Mountain, at „Debarcader”, battered places where the sheep were stationed, alt. about 1,600 m, 25.VIII.2004, Violeta Boruz [CRAI]; Straja Mountain near Lupeni (Buia 1956: 697) - FR 4.

HR: Borsec at Mt. „Bükkhavas” - LN 4 (r. Toplița - LM 3) (Buia 1956: 697); Giurgeului Mountains: Mt. „Öcsém” on Curmătură (Buia 1956: 697) - MM 1; Hăghimașu Mare Mountain, Ciuc district (Buia 1956: 697) - MM 1; Lutița, Căpâlnița, Odorhei district (Buia 1956: 697) - LM 4; Hăghimaș on Öcsém, 27.VI.1952, M. Mihai under *A. vulgaris* L., revised Violeta Boruz 2006 [I 59.874] - MM 1; „In apice (1545 m) et declivibus NV (1200 - 1480 m.s.m.) montis Piricske supra pag. Lăzarea (hung.: Szárhegy), Montibus Giurgeu, 16.VII.1948, E. I. Nyárády et fil.” under *A. palmata* Gilib. var. *acutangula* (Buser) A. et G., revised Violeta Boruz 2007 [SIB 147.309] - LM 3; „In pratis humidis uliginosisve rivi „Csorgó” ad fluv. Mureș pr. pag. Lăzarea, alt. 719 - 725 m.s.m., distr. Ciuc, 15.VII.1948, E. I. Nyárády et fil.” under *A.*

palmata Gilib. var. *pastoralis* (Buser) A. et G., revised Violeta Boruz 2007 [SIB 147.311] - LM 3; Transilvania, Harghita distr., Lake St. Anne, meadows, 12.VII.1992, G. Groza under *A. vulgaris* L., revised Violeta Boruz 2007 [CL 65.820] - MM 2; „Transsilvania, distr. Ciuc, circa Lacum Sf. Ana supra balneas Tușnad Băi, alt. cca. 1050 - 1100 m.s.m., 17.VI.1929, E. I. Nyárády” under *A. silvestris* Schm., revised A. Plocek 1990 [CL 195.842] - MM 2; Transilvania, Harghita County, Tușnad Băi, 1.VIII.1937, Mihai Serban under *A. silvestris* Schm., revised Violeta Boruz 2007 [CL 649.684] - MM 2; „Circa saxam singularem „Egyeskő” supra pag. Balan, alt. 1540 m.s.m., distr. Ciuc, 6.VIII.1948, E. I. Nyárády” under *A. palmata* Gilib. var. *pastoralis* (Buser) A. et G., revised Violeta Boruz 2007 [SIB 147.310] - MM 1; „Comit. Ciuc, in rupestribus apricis montis Terkő supra pagum Balánbánya, alt. 1463 m.s.m., solo calc., 22.V.1921, E. I. Nyárády” under *A. silvestris* Schm., revised Violeta Boruz 2007 [SIB 147.319] - MM 1; „Distr. Ciuc, alt. 1540 m.s.m., pg. Bălan, E. I. Nyárády” under *A. palmata* Gilib. var. *pastoralis* (Buser) A. et G., revised Violeta Boruz 2005 [BUCA 69.532] - MM 1; „Transsilvania, distr. Ciuc, Mtibus. Harghita, in Abietis vallis Csicsaj patak, sub Ördögto inter pagos Zetea et Suseni, alt. cca. 950 - 1100 m.s.m., 14.VI.1929, E. I. Nyárády” under *A. silvestris* Schm., revised A. Plocek 1990 [CL 195.847] - LM 3, LM 4; „Csik, Hargita: Nagy-Madarași patak kő, 800 - 1450 m, 30.VI.1916, E. I. Nyárády” under *A. montana* W., revised Violeta Boruz 2007 [SIB 147.237] - MM 2; „Comit. Csik in jugo montis Nagy-Hagymás supra pagum Balán, alt. cca. 1700 m.s.m., solo calc., 10.VII.1921, E. I. Nyárády” under *A. hybrida* (L.) Mill., revised Violeta Boruz 2007 [SIB 147.238] - MM 1; „Transsilvania, distr. Ciuc, alt. cca. 1676 m.s.m., 7.VII.1938, E. I. Nyárády” under *A. hybrida* (L.) Mill., revised Violeta Boruz 2007 [SIB 147.246] - MM 2; Borsec, ? leg. et det. under *A. vulgaris* L., revised A. Beldie 1971 [BUCF 1649] - LN 4; „Hargita: Csomafalvi Délhegy É-old., alt. 790 - 850 m, 30.VI.1942, E. I. Nyárády” under *A. hybrida* (L.) Mill., revised A. Plocek 1990 [CL 260.082]; „Csomafalvi Délhegy É-i alja, 750 - 850 m.s.m., 1.VII.1942, E. I. Nyárády” under *A. hybrida* (L.) Mill. var. *plicata* Buser, revised A. Plocek 1990 [CL 260.083]; „Locus natalis: Hargita, Csomafalvi Délhegy, 1400 m.s.m., 30.VI.1942, E. I. Nyárády” under *A. hybrida* (L.) Mill. var. *plicata* Buser, revised A. Plocek 1990 [CL 260.084] - LM 3; „Reg. Mureș-Aut. Magh. R. Odorhei, Chirui-Băi, cca. 800 m.s.m., 24.VI.1961, E. Vicol” under *A. hybrida* (L.) Mill. subsp. *plicata* (Buser) Palitz, revised A. Plocek 1990 [CL 615.974, 615.605] - LM 4; „Transsilvania, distr. Ciuc. In valle superiora fluvii Mureș inter pagos Tinca et Vosláb., alt. cca. 800 - 830 m.s.m., 1.VII.1924, E. I. Nyárády” under *A. hybrida* (L.) Mill. var. *plicata* Buser, revised A. Plocek 1990 [CL 195.848] - LM 3; Ciuc Mountains: In the meadows, at Jigodin-Băi, Șumuleu Ciuc, Frumoasa, Pasul Ghimeș – MM2, Livezi, Poiana Fagului, Lunca de Jos, Făget, Făgețel, Nășcălat, 2019-2020, Violeta Boruz [CRAI] – MM1.

MH: Baia de Aramă, Măneasa Mountain, alt. 1,200 m, 7.VII.1955, leg. A. Buia, M. Păun, P. Badea [CRAI] - FQ 1.

MM: Rodnei Mountains (Coldea 1990: 125), on Pietrosu Mare (Buia 1956: 697 under *A. vulgaris* L. subsp. *pastoralis* (Buser) Palitz) - LN 1.

MS: Hungarian Autonomous Region, Toplița district, Lunca Bradului locality, in the meadows, alt. about 600 m, 4.VII.1958, leg. C. Chirilă [BUAG 14.580] - LN 4; „Sovata: Hunyadi szálló körül cca. 525 m, 29.VII.1943, E. I. Nyárády” under *A. silvestris* Schm., revised Violeta Boruz 2007 [SIB 147.317] - LM 3.

NT: Ceahlău Mountain, 4.VIII.1964, V. Zanoschi under *A. vulgaris* L., revised Violeta Boruz 2006 [IAAG 14.604]; Ceahlău, Neamț County, on the plateau, meadows on the subalpine floor, 15.VII.1987, I. Sârbu under *A. glaucescens* Wallr., revised Violeta Boruz 2006 [IAGB 23.685]; Ceahlău, 7.VII.1912, leg. et det. ? under *A. vulgaris* L. subsp. *pratensis* Camus, revised Violeta Boruz 2006 [I 12.350]; Ceahlău, 1970, C. Dobrescu under *A. vulgaris* L., revised Violeta Boruz 2006 [I 68.068] - MN 2; „Moldova, Piatra cu apă, in monte Ceahlău, alt. 1500 m.s.m., 26.V.1924, E. I. Nyárády” under *A. hybrida* (L.) Mill. var. *plicata* Buser,

revised A. Plocek 1990 [CL 195.840] - MN 2; Towards Poiana Stâncii, 8.VIII.1935, M. Răvăruf under *A. vulgaris* L. subsp. *acutangula* (Buser) Palitz, revised Violeta Boruz [I 12.339] - MM 1, MN 2; Cheile Bicazului, 1928, Al. V. Alexandri [BUCA 35.876] - MM 1; Lacu Roșu locality, Neamț County, forest edge, 12.VI.1969, leg. C. Burduja and I. Sârbu, det. I. Sârbu under *A. vulgaris* L. subsp. *acutangula* (Buser) Palitz, revised Violeta Boruz 2006 [I 42.868]; Lacu Roșu locality, Neamț County, the edge of the lake, 12.VI.1969, leg. C. Burduja and I. Sârbu, det. I. Sârbu under *A. vulgaris* L. subsp. *acutangula* (Buser) Palitz, revised Violeta Boruz 2006 [I 42.866] - MM 1; Lacu Roșu locality, Neamț County, the edge of the lake towards the trout farm, 12.VI.1969, leg. C. Burduja and I. Sârbu, det. I. Sârbu under *A. vulgaris* L. subsp. *acutangula* (Buser) Palitz, revised Violeta Boruz 2006 [I 42.867] - MM 1.

PH: Sinaia, Bușteni, V. Coștilei, V. Ialomiței, V. Obârșiei (Beldie 1967: 169 under *A. palmata* Gilib. var. *pastoralis* (Buser), syn. *A. monticola* Opiz); Azuga locality, in forest meadows to the subalpine subzone, skeletal soil and skeletal peat, 19.VIII.1908, P. Enculescu under *A. vulgaris* L., revised Violeta Boruz 2006 [I 84.555]; „Muntenia, distr. Prahova, Montibus Bucegi. In herbis subalpinis Mtis Jepii Mari supra pag. Sinaia, alt. cca. 1900 - 2000 m.s.m., 10.VIII.1929, E. I. Nyárády” under *A. silvestris* Schm., revised A. Plocek 1990 [CL 195.816] - LL 4; „Muntenia, distr. Prahova, Montibus Bucegi. In valle „Valea Cerbului”, alt. 2500 - 1800 m.s.m., 9.VII.1931, E. I. Nyárády” under *A. silvestris* Schm., revised A. Plocek 1990 [CL 195.816] - LL 4; „In valle Mălăiești montibus Bucsecs, alt. cca. 1400 m.s.m., 28.VII.1906, E. I. Nyárády” under *A. silvestris* Schm., revised Violeta Boruz 2007 [SIB 147.307]; The Bucegi Mountains, in the Mălăiești Valley, alt. about 1,800 – 1,850 m, trough subalpine pastures, 10.VII.1980, D. Parascan and M. Danciu [HBV 060.998]; the Bucegi Mountains in Mălăiești Valley, above the cottage, 10.VII.1980, D. Parascan and M. Danciu [HBV 060.046]; the Bucegi Mountains, in Mălăiești Valley, alt. about 1,800 m, 10.VII.1980, D. Parascan and M. Danciu [HBV 060.999]; Bucegi Mountains, in the Jepilor Mari Valley, alt. about 1,500 m, 6.VII.1982, D. Parascan and M. Danciu [HBV 060.997]; Bucegi Mountains, Ialomiței Valley at Padina, 5.VI.1956, A. Beldie [BUCF 1657, 1658]; Bucegi, Furnica, 9.VIII.1957, A. Beldie [BUCF 1654]; Bucegi, Coștilei Valley, alt. 1,300 m, VI.1943, A. Beldie [BUCF 1652]; Bucegi Mountains, “Poiana Țapului” (Buia 1956: 697); „Poiana Țapului”, 2.VIII.1947, A. Beldie [BUCF 1650] - LL 4; Bucegi, Caraiman trough the meadows, 5.VII.1961, D. Parascan under *A. hybrida* (L.) Mill., revised M. Danciu [HBV 001.456] - LL 4; Radila Mountain, 1.VII.1934, leg. Haralamb et Cretzoiu, det. J. Neuwirth under *A. vulgaris* L., revised Violeta Boruz [BUCF 1706] - LL 4; Red Chalet Alpine Reservation, 22.VI.1936, leg. A. Haralamb, det. A. Beldie, revised W. Rothmaler [BUCF 1711] - ML 2; Zăganu Mountain, to Cheia, 30.VIII.2000, Pant. Ularu and Dan Gurean under *A. xanthochlora* Rothm., revised Violeta Boruz [HBV 063.716] - ML 2; Ciucaș Mountains - Zăganu (Maria Ciucă 1984: 40 under *A. palmata* Gilib.; Maria Ciucă & A. Beldie 1989: 61 under *A. monticola* Opiz) - ML 2; Prahova County, Ciucaș Massif, between Red Mountain chalet and Ciucaș Peak, alt. about 1,200-1,950 m, 18.VII.2007, Violeta Boruz [CRAI]; Prahova County, Ciucaș Massif, Ciucaș Peak, in meadows, alt. about 1,945 m, 18.VII.2007, Violeta Boruz [CRAI]; Prahova County, Ciucaș Massif, on the side of the road to the Red Mountain, alt. about 1,250 m, 18.VII.2007, Violeta Boruz [CRAI]; Prahova County, Ciucaș Massif, on the Beer Valley, alt. about 1,200 m, 18.VII.2007, Violeta Boruz [CRAI]; Prahova County, Ciucaș Massif, in the meadow near Ciucaș Chalet, alt. about 1,550 m, 18.VII.2007, Violeta Boruz [CRAI]; Prahova County, Ciucaș Massif, between Red Mountain chalet and Zăganu Peak, alt. about 1,600 m, 19.VII.2007, Violeta Boruz [CRAI]; Prahova County, Ciucaș Massif, between Cheia locality and Red Mountain Chalet, at the edge of the beech forest, alt. about 900 m, 18.VII.2007, Violeta Boruz [CRAI] - ML 2.

SB: Sibiului Mountains: Păltiniș, Beșineu (Buia 1956: 697), Bătrâna Peak, Arșița Hill (Drăgulescu 2003: 136) - GR 1; Bălea Waterfall, 15.VII.1962, leg. et det. ? under *A. vulgaris*

L. subsp. *subcrenata* (Buser) Palitz, revised Violeta Boruz 2006 [IAAG 14.607] - GR 1; Pălăniș - Comanda, 1,300 m, 14.VI.1969, Fr. Gündisch under *A. vulgaris* L., revised Violeta Boruz 2007 [SIB 094.901] - GR 1.

SV: "Moldova, in monte Rarău supra pag. Câmpulung, alt. 1600 m, solo calc., 18.VII.1949, A. et E. I. Nyárady" under *A. vulgaris* L. s. l., revised Violeta Boruz 2007 [SIB 147.318] - LN 3; Suceava region, Rădăuți district, at the edge Rădăuți city, in the meadows of Ochiuri, 17.VI.1955, C. Chirilă under *A. vulgaris* L., revised V. Ciocârlan 1996 [BUAG 14.579] - MN 1/MP 2.

VL: Between Voineasa and Obârșia Lotrului, alt. about 900 m, 18.VII.2005, Violeta Boruz [CRAI]; Obârșia Lotrului, along the river bank, among the stones, alt. about 1,350 m.s.m., 21.IX.2004, Violeta Boruz [CRAI]; Vâlcea County, Vidra Lakenear Vidra Villa Complex, slightly sloping western slope (3-8'), alt. about 1,280 m, 18.VII.2005, Violeta Boruz [CRAI] - GR 2; Vâlcea County, between Obârșia Lotrului and Aviatorului Chalet, towards Călcescu Lake, alt. about 1,300 – 1,400 m, 30.VIII.2006, Violeta Boruz [CRAI]; Căpățâni Mountains on Piatra Mountain, towards Piatra Peak, in meadows, alt. about 1,750 m, 29.VI.2002, Violeta Boruz [CRAI] - KL 4; Căpățâni Mountains, the edge of the spruce forest, „Curmătura Rodeanu”, alt. about 1,628 m, 26.VII.2005, Violeta Boruz [CRAI] - GR 2/KL 4.

VN: River Basin Milcov-Piscul Berzei, Andreiașu locality (Ana-Maria Coroi 1997) - ML 3; Moldova, Vrancea district, Vrancei Mountains, Condratu Mountain, 23.VI.1996, leg. E. Nicol, det. G. Groza under *A. vulgaris* L. subsp. *pastoralis* (Buser) Palitz, revised Violeta Boruz 2007 [CL 658.327] - ML 3.

Phytocoenology: It has been identified in several associations and floristic combinations from *Polygono-Trisetion*, *Arrhenatheretalia*, *Potentillo-Nardion*, *Elyno-Seslerietea*, *Calamagrostietalia villosae*, *Rumicion alpini* and others:

In *Scorzonero roseae* - *Festucetum nigricantis* (Pușcaru et al. 1956) Coldea 1978, on Văleanu Peak (Căpățâni Mountains) the floristic composition is: *Festuca nigrescens* 2-3, *Scorzonera rosea* +, *Nardus stricta* 1-2, *Alchemilla monticola* +, *A. connivens* 1-2, *A. crinita* +, *A. micans* +, *A. glabra* +, *Deschampsia flexuosa* +, *Poa media* +, *Anthoxanthum odoratum* +, *Phleum alpinum* subsp. *alpinum* +, *Luzula spicata* +, *L. campestris* +, *Trifolium repens* +, *Crocus vernus* +, *Geum montanum* +, *Gnaphalium supinum* +, *Veronica officinalis* +, *Homogyne alpina* +, *Ranunculus serpens* subsp. *nemorosus* +, *Potentilla erecta* +, *Polytrichum* spp. 1.

In *Agrosti* - *Festucetum rubrae* Horv. (1951) 1952 I recorded it in the Lotru, Vâlcan, Parâng, Ciucaș, Ciuc Mountains and others.

In the spruce floor, at Vidra Villas Complex (Lotru Mountains), on a rocky southern slope, with floristic composition: *Festuca rubra* 2-3, *Agrostis capillaris* subsp. *capillaris* 1-2, *Deschampsia cespitosa* + -1, *Erigeron acris* subsp. *acris* +, *Trifolium pratense* 1-2, *Gnaphalium sylvaticum* +, *Pilosella aurantiaca* subsp. *aurantiaca* +, *Alchemilla connivens* + -1, *A. monticola* 1-2, *A. crinita* + -1. On an area of about 2 ha in this association, the physiognomy of the meadow is given by the three species of *Alchemilla* and *Trifolium pratense*.

In the Vâlcan Mountains (Constantinescu Plateau, Piatra Vindereului), with the following floristic combination: *Festuca rubra* 2-3, *Agrostis capillaris* subsp. *capillaris* 1-2, *Deschampsia cespitosa* + -1, *Trifolium repens* +, *Plantago gentianoides* +, *Veronica officinalis* +, *V. serpyllifolia* subsp. *serpyllifolia* +, *Alchemilla monticola* + -1, *Sagina saginoides* +.

Towards Slivei Peak (Parâng Mountains), near the spruce forest, in ruderalized meadow, intermediate between *Deschampsietum cespitosae* and *Agrosti* - *Festucetum rubrae*: *Festuca rubra* 3-4, *Agrostis capillaris* subsp. *capillaris* 1-2, *Nardus stricta* + -1, *Poa annua* +, *Alchemilla connivens* 2-3, *A. crinita* + -1, *A. micans* +, *A. glabra* +, *A. monticola* +, *Leontodon autumnalis* subsp. *pratensis* +, *Trifolium repens* +, *T. pratense* +, *Leucanthemum*

vulgare subsp. *vulgare* +, *Ranunculus acris* subsp. *acris* +, *R. repens* +, *Picea abies* (juv.) +, *Stellaria uliginosa* +, *Cerastium fontanum* subsp. *fontanum* +, *Juncus tenuis* +, *J. conglomeratus* +, *Plantago media* +.

In the Ciucaș Mountains, on Red Mountain, with floristic composition: *Festuca rubra* 2-3, *Agrostis capillaris* subsp. *capillaris* 1-2, *Cynosurus cristatus* 2-3, *Alchemilla monticola* +, *A. crinita* +, *Stellaria graminea* +, *Prunella vulgaris* +, *Bellis perennis* +, *Trifolium repens* +, *Carum carvi* +, *Lolium perenne* +, *Leontodon autumnalis* subsp. *pratensis* +, *Rumex crispus* +, *Ranunculus montanus* subsp. *pseudomontanus* +, *Carduus acanthoides* +, *Scorzonera rosea* +, *Campanula serrata* +, *Plantago media* +, *Lotus corniculatus* +.

In *Festucetum saxatilis* Domin 1933, meadow on limestone rock on Piatra Peak in the Căpățâni Mountains, having the following floristic combination: *Festuca rupicola* subsp. *saxatilis* 1-2, *Koeleria macrantha* subsp. *transsilvanica* + -1, *Festuca nigrescens* 2, *Minuartia verna* subsp. *verna* + -1, *Sedum alpestre* +, *Alchemilla monticola* +, *Asplenium trichomanes* +, *Agrostis capillaris* subsp. *capillaris* +, *Juniperus sibirica* +, *Ranunculus oreophilus* +, *R. montanus* subsp. *pseudomontanus* +, *Trifolium repens* +, *T. alpestre* +, *Hypericum maculatum* +, *Pilosella aurantiaca* subsp. *aurantiaca* +, *Cerastium arvense* subsp. *calcicola* +, *Pulsatilla alba* +, *Anthyllis vulneraria* subsp. *alpestris* +, *Sagina saginoides* +, *Myosotis alpestris* +, *Scleranthus uncinatus* +.

In *Urtico dioicae - Rumicetum alpini* (I. Șerbănescu 1939, Todor et Culică 1967) corr. Oltean et Dihoru 1986, on the Beer Valley (Ciucaș Mountains), *A. monticola* grows together with the following species: *Rumex alpinus* 2-3, *Urtica dioica* + -1, *Stellaria nemorum* +, *Geranium phaeum* +, *Lamium maculatum* subsp. *cupreum* +, *Rumex alpestris* +, *Alchemilla mollis* +, *A. glabra* +, *Ranunculus repens* +, *Impatiens noli-tangere* +, *Athyrium filix-femina* +, *Prunella vulgaris* +, *Trifolium pratense* +, *T. repens* +.

In *Phleo alpini - Deschampsietum cespitosae* (Krajina 1933) Coldea 1983, at Ciucaș Chalet, meadow on the gentle eastern slope, I recorded it in the floristic composition: *Deschampsia cespitosa* 2-3, *Phleum alpinum* subsp. *alpinum* 1-2, *Agrostis rupestris* + -1, *Festuca nigrescens* +, *Anthoxanthum odoratum* +, *Nardus stricta* + -1, *Alchemilla monticola* +, *Hypericum maculatum* +, *Stellaria graminea* +, *Rumex alpinus* +, *Viola declinata* +.

In *Dryadetum octopetalae* Csűrös et al. 1956, on Zăganu Peak (Ciucaș Massif), with the following floristic combination: *Dryas octopetala* 3, *Festuca supina* + -1, *Potentilla ternata* + -1, *Minuartia verna* subsp. *collina* +, *Phyteuma confusum* +, *Carex sempervirens* +, *Festuca nigrescens* +, *Alchemilla monticola* +.

On Red Mountain, along the road through the spruce forest to the Ciucaș hut, grows together with *Poa annua*, *Campanula abietina*, *Alchemilla mollis* etc.

General spread: Eurasia (Outside Europe, naturally present in western Siberia and northwestern Anatolia).

CONCLUSIONS

Clarifications and completions have been made regarding the chorology of the species *A. monticola* in the Romanian Carpathians. In many works of flora and vegetation in Romania, given the difficulties of determination, in the past, the botanists avoided specifying the microspecies, being satisfied with the aggregate species *Alchemilla vulgaris* L., as it can be seen from the chorology data collected after the consulting the herbs in the country.

Some taxonomic clarifications have also been made and chronology data were presented for the species *A. monticola* from the Romanian Carpathians.

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TAXONOMIC, CHOROLOGIC AND COENO-ECOLOGIC FEATURES OF THE *ALCHEMILLA COLORATA* SPECIES

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ABSTRACT

Monographic research on the *Alchemilla* genus has been motivated by its complexity. *Alchemilla* species are mountainous, subalpine and alpine plants, perennial, small to medium. Their identification is usually difficult. The aim was to find new characters and criteria for the most precise delimitation of the different microspecies. Apart from the delimitation and description of species of this genus and in addition to morphological criteria, other criteria are required, such as ecology, chorology, phytogeography, karyology etc.

Alchemillacolorata, analyzed in this paper, is a microspecies that has separated itself from the aggregate species *Alchemillahybrida* (L.) Mill. In addition to taxonomy information, ceno-ecological characteristics and new data on the chorology of this taxon in the Romanian Carpathians are presented.

INTRODUCTION

Alchemilla species are mountainous, subalpine and alpine plants, perennial, small to medium. Their identification is usually difficult. In this sense, *Alchemillacolorata*, a microspecies that emerged from the aggregate species *A. hybrida* (L.) Mill., present in the Romanian Carpathians, is analyzed in detail.

A. colorata (R) is on the Red List of higher plants in Romania (Oltean M. & al. 1994).

MATERIAL AND METHOD

The researches on the species of the *Alchemilla* genus were carried out on the itinerary in the Romanian Carpathians. For identification of the *Alchemillacolorata* species we have used the specialty literature (Assenov 1973, Buia 1956, Ciocărlan 2009, Fröhner 1990, 1994, Walters & Pawłowski 1968). In the identified *Alchemilla* species, including *A. colorata*, complex ecological, phytocenological seasonal observations were made, but also on the plantlet. The ecology is presented either on the basis of speciality literature data but also on the personal observations over the itinerary research of the species. The chorology is accomplished on the map type Atlas Florae Europaeae, with tetrathes of 50 x 50 km, using the indexes U.T.M. (Universal Transverse Mercator) transformed (Lehrer & Lehrer 1990). After consulting the main Herbariums from the country (BUCA, BUAG, BUCF, CRAI, HBV, CL, I, IAGB, SIB) the herbarium materials have been verified and the possible errors of identification were corrected. For Herbariums were used the abbreviations according to Index herbariorum (P. K. Holmgren 1990). The authors of the species are written according to present standards (Brummit & Powell 1992).

RESULTS AND DISCUSSIONS

Alchemilla colorata Buser 1891, Not. Alchim.: 10.

Syn.: - *A. pubescens* Lam. var. *colorata* (Buser) Briq. 1899 in Burnat, Fl. Alp. Marit. 3: 139; - *A. pubescens* Wallr. subsp. *montana* (Willd.) Asch. et Graebn. var. *fiabellata* (Buser) Asch. et Graebn. subvar. *colorata* (Buser) Asch. et Graebn. 1902, Syn. 6: 403; - *A.*