

# CONSIDERATION ON SOME PHYTO – ECOLOGICAL DIAGNOSIS PROBLEMS IN THE PIEDMONT OF ORĂȘTIE COULOIR

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The general interest in environmental problems stimulated the contribution of many scientific disciplines to understanding, objective analysis and integrated study of various ecological aspects.

Concerning the phyto-ecology its ability, particularly in valuation and management of natural resources is leaned upon the real capacity of the vegetation to express the state of environment, the ample themes and a rigorous studying structure for ecological diagnosis. Based on this idea, the paper presents some phyto-ecological diagnosis problems resulting from the researches carried out on meadow floristic composition in piedmont area of Orăștie Couloir (a sector of the Mureș board valley couloir). (Fig. 1).

Formed in the North of Șureanu Mountains, between Cugir valley and Cerna – Strei depression, the piedmont realises the transition to Mureș fluvial terraces, by an equilibrated and unitary ensemble (Fig. 1a, 2b). The following general conclusions synthesize the principal results of the physical – geographical researches, in this area:

- the development in step of the relief, with a low morphological differentiation, under the influence of internal structure, between 300 m and 600 m altitude;
- the relative low level of the morphometric indices and implicitly, of the present modelling processes;
- the moderate climate, without important differences between steps of altitude;
- the prevalence of the luvisols, mezotrophic soils, with an eluvial horizon and a significant clay content;
- the considerable extension of the herbaceous vegetation and the pastoral character of this area, under the long human pressure.

These features suggesting both the availability for selfadjustment of the environment and the manifestation within limits of the temporal or spatial variability, justify an approach to ecological diagnosis problems in a phyto-ecological view.

In this respect, even some specifications, resulting from the initial stage of floristic investigation, may prove relevant.

The first of these is identification of the meadow type *Agrostis capillaris* with diverse mesophyllous species, as a representative synthetical unit for the vegetation long term evolution, ecological substratum, general level of

productivity, geographical integrity of the piedmont and artificiality degree of the environment. Some essential features define this type:

- the abundant floristic composition, with graminaceae (about 75%), such as *Agrostis capillaris*, *Festuca rubra*, *Anthoxanthum odoratum*, *Cynosurus cristatus*, *Holcus lanatus*, *Briza media*, *Phleum pratense*, associated with leguminous plants such as *Genista tinctoria*, *Trifolium pratense*, *Trifolium repens* and some species appertaining to other families – *Achillea millefolium*, *Plantago lanceolata*, *Campanula patula*, *Prunella vulgaris*...;

- the presence of the species in a large measure heliophytes, whose ecological exigences show the preferences for mesothermic conditions, with a moderate humidity and the tolerance given the acidity or the low nitrogen content of the soil;

- the middling production (10,000 – 12,000 kg/ha) green matter; the compact and elastic green surface, with mixed employment and a long enough period of exploitation;

- the continuous process of natural re-afforestation, attesting the secondary character and the extensive exploitation of the meadow.

The indicatory value of this meadow type is also proved by the observations under the cutting conditions.

On the Cucuiş valley for exemple, just on the line of the beech forest, the ligneous vegetation represented by the basic species *Fagus sylvatica*, invasion species and cutting, making way to the lying fallow process, by the expansion of the Gramineae species, whose the covering degree attain 30% (Table 1), after approximately 6 years from the clearing; the competition is between *Epilobium amgustifolium* and *Rubus idaeus* in the upper layer and between *Agrostis capillaris* and *Fragaria vesca* in the lower layer.

In the village Romos, after the clearing, succeeded the populating with 69 species and a covering of 5-7%, during of the first year, the increase of the number of herbaceous species, attaining a covering degree of 50% in the second year, than the expansion of the graminaceae, the assumption of the part of erecting dominant by the main lying fallow species, *Agrostis capillaris* with the typical grassland species (*Phleum pratense*, *Lotus corniculatus*, *Luzula campestris*, *Achillea millefolium*, *Plantago lanceolata*, *Veronica officinalis*), still accompanied by some cutting species, concomitantly with a significant reduction of the floristic fluctuations.

Admitting that the vegetation of the both clearing surfaces evolves towards the meadow of *Agrostis capillaris* with diverse mesophyllous species, this zonal type could be considered an indication for the quality of ecological sector of the whole piedmont, on an environmental ecological hierarchic system. (Table 2).

Besides the basic ecological features, expressed by the dominant meadow type and relevant for the natural potentiality of the piedmont, several local peculiarities call attention to some environmental variables and evolutive tendencies that bear on the ecosystems functioning and the quality of the natural resources. This category includes some structural modifications in the meadow of *Agrostis capillaris* with diverse mesophyllous species, under the influence of stational conditions (Table 2), consisting in:

- the diminution of the number of species and economic value, on the grounds with the middling slope and little–moderate processes of superficial erosion, by the evanescence of some valuable graminaceae, such as *Festuca pratensis* and *Phleum pratense* and by the lowering with 50% of leguminous plants, in concordance with an lower trophic level;

- the lowering of biomass quality at the same time as the extension of Juncaceae and Cyperaceae species, but also of many other unvaluable species, as a result of some progressive phenomena of compaction and pseudogley horizons forming, favoured by the loamy texture of the luvisols and the plane surface of the lands;

- the affecting of maintaining capacity of leguminous and graminaceae species in the floristic fund and gradual physiognomic modification, owing to the expansion of the Juncaceae in the grasslands tarried at luvisol albic with pseudogley horizons, where the bed structuring and the aerohydrous deficiencies act negatively on the organic matter extraction out of the soil.

These observations point out two essential aspects for phyto-ecological diagnosis of the lands:

- the differentiation of the stational conditions and therefore the forming of the ecological stations, in accordance with the quality of edaphic environment;

- the reference of ecological valuations to some environmental variables, such as: declivity of the land, soil structure and texture, degree of base saturation of the soils, available edaphic volume, organic and mineral trophic level.

It is necessary to mention that the degradation processes are intensified especially under conditions of some exploitation deficiencies (compaction, erosion). As a matter of fact, the grasslands are very sensitive to the mode of exploitation, even on good environmental conditions, as for instance the appearance of *Rhinanthus angustifolius*, an indicatory species of late mowing, in Sibişel meadow area.

At the same time, any intervention for soil acidity correction and content of nutrients increase (nitrogen, for exemple) has to relate to the natural ground limits of acceptance and to the speies genetic potentiality.

*Table 3. Floristic composition of a meadow of Dactylis glomerata with diverse mesophyllous species under bottom land conditions*

| Nr. | Species               | Average dominance *1 | Fodder value *2 |
|-----|-----------------------|----------------------|-----------------|
|     | Gramineae             | 85%                  |                 |
| 1.  | Dactylis glomerata    | 3/45                 | F 3             |
| 2.  | Festuca pratensis     | 2/10                 | F 5             |
| 3.  | Agrostis capillaris   | 2/10                 | F 3             |
| 4.  | Lolium perenne        | 1/5                  | F 5             |
| 5.  | Arrhenatherum elatius | 1/5                  | F 4             |
| 6.  | Poa pratensis         | 1/5                  | F 4             |
| 7.  | Phleum pratense       | 1/2                  | F 5             |
| 8.  | Bromus erectus        | 1/3                  | F 2             |
|     | Leguminosae           | 1%                   |                 |
| 9.  | Trifolium pratense    | +                    | F 4             |
| 10. | Vicia species         | +                    | F 3             |
|     | Other species         | 14%                  |                 |
| 11. | Achillea millefolium  | 1/3                  | F 2             |
| 12. | Centaurea phrygia     | 1/5                  | X               |
| 13. | Rumex crispus         | 1/3                  | X               |
| 14. | Rumex acetosa         | 1/1                  | X               |
| 15. | Stellaria graminea    | +                    | X               |
| 16. | Daucus carota         | +                    | F 2             |
| 17. | Plantago lanceolata   | +                    | F 2             |
| 18. | Prunella vulgaris     | +                    | X               |
| 19. | Leontodon autumnalis  | +                    | F 1             |
| 20. | Taraxacum officinale  | +                    | F 2             |

\* 1 – after the Braun-Blanquet scale – covering degree /  $\hat{I}$

\* 2 – after the indicators of meadows flora – I.A. Kovacs, 1979.

Taking account of the geographical landscape unity and spatial extension of *Agrostis capillaris* with diverse mesophyllous species meadow type\*<sup>1</sup>, the approach of phyto-ecological diagnosis at station level, impose a profound study, based on details of the floristic composition and of the other environmental factors.

Although the present paper had in a view only a few phytoecological problems in the piedmont of Orăștie Couloir, from the resulted conclusions, phyto-ecological methodology appears to have certain advantages for ecological diagnosis requirements of a territorial ensemble.

\*1 A whole changing of vegetation occurs only in the bottom land space, where grow the meadow of *Dactylis glomerata* with diverse mesophyllous species (Table 3).

Fig. 1.

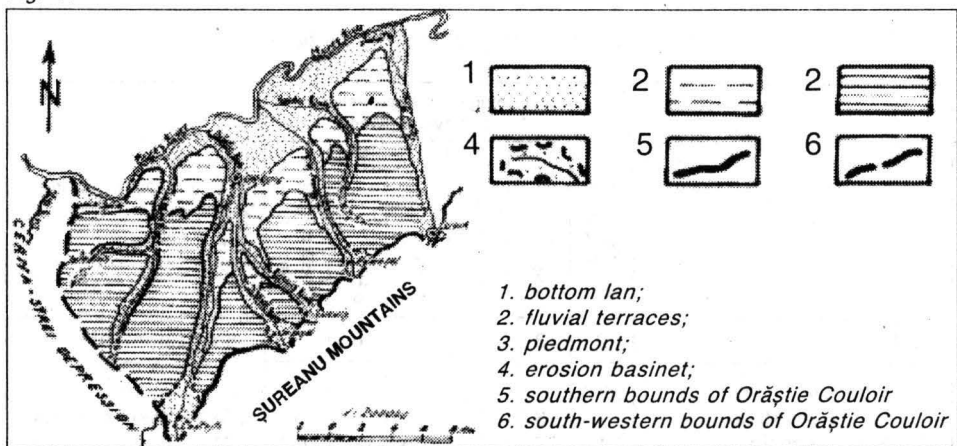
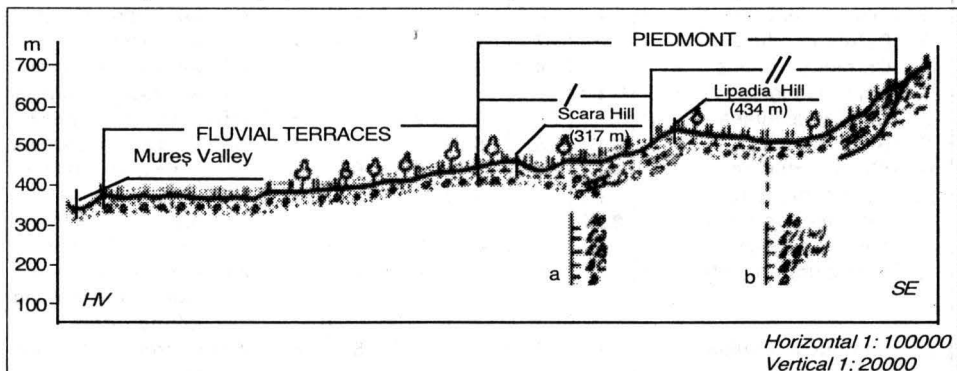


Fig. 1a. Geographical location of the piedmont area in Orăștie couloir



|                      |   |   |              |              |               |
|----------------------|---|---|--------------|--------------|---------------|
| MORPHOMETRIC INDICES | AVERAGE RELIEF ENERGY (m/km)                        |   | 26           | 38           |               |
|                      | HORIZONTAL BREAKING UP DENSENESS OF THE RELIEF (km) |   | 1.8          | 1.3          |               |
|                      | SLOPE   | AVERAGE   | 3            | 5            |               |
|                      |   | VARIATION COEFFICIENT (S )                            | 89 °         | 99 °         |               |
|                      |   | THE GREATEST FREQUENCY CLASSES RELATIVE FREQUENCY (f) | 0 - 3<br>0.7 | 0 - 3<br>0.4 | 4 - 10<br>0.4 |
| CLIMATIC INDICES     | ANNUAL AVERAGE TEMPERATURE ( C )                    |   | 8 - 9        | > 8          |               |
|                      | ANNUAL THERMIC AMPLITUDE ( C )                      |   | 22.5 - 23    | < 22         |               |
|                      | ANNUAL RAINFALL (mm)                                |   | 600 - 700    | 700 - 800    |               |
|                      | CLIMATIC BALANCE (mm)                               |   | - 57 - S+54  | +50 - +104   |               |
|                      | ANNUAL SUNLIT DURATION (hours)                      |   | 1850 - 1900  | >1800        |               |

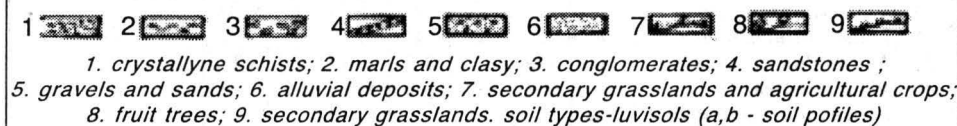


Fig. 1b. Physical geographical Cross-section through piedmont area of Orăștie couloir

Flora characteristics of a cutting on the line of the beech forest

| Nr. | Species  | covering degree *1<br>(dominance) | Ecological characteristics *2<br>Behaviour given: |             |          |     |                             | Economic<br>features | Observations  |
|-----|--|-----------------------------------|---|-------------|----------|-----|-----------------------------|----------------------|---|
|     |  |                                   | Light   | Temperature | Soil     |     |                             |                      |   |
|     |  |                                   |   |             | Moisture | p H | Mineral nitrogen<br>content |                      |   |
| 0   | 1  | 2                                 | 3   | 4           | 5        | 6   | 7                           | 8                    | 9   |
|     | <i>Ligneous species</i>                              | 35%                               |   |             |          |     |                             |                      | - basic species   |
| 1   | <i>Fagus silvatica</i>                               | 1                                 | 3   | 5           | 5        | x   | x                           | x;D                  |   |
| 2   | <i>Rubus species</i>                                 | 1                                 | 7   | 5           | 5-6      | x-7 | 7-9                         | x;D                  |   |
| 3   | <i>Sambucus nigra</i>                                | +                                 | -   | -           | -        | -   | -                           | x;D                  |   |
| 4   | <i>Tilia tomentosa</i>                               | +                                 | -   | -           | -        | -   | -                           | x;D                  |   |
| 5   | <i>Betula pendula</i>                                | 2                                 | 7   | x           | x        | x   | x                           | x;D                  |   |
| 6   | <i>Carpinus betulus</i>                              | 2                                 | 4   | 6           | x        | x   | x                           | x;D                  |   |
| 7   | <i>Populus nigra</i>                                 | 1                                 | -   | -           | -        | -   | -                           | x;D                  |   |
| 8   | <i>Corylus avellana</i>                              | 1                                 | 7   | 6           | x        | x   | x                           | x;D                  |   |
| 9   | <i>Rosa canina</i>                                   | 1                                 | 8   | 5           | 4        | x   | x                           | M;D                  |   |
| 10  | <i>Alnus glutinosa</i>                               | +                                 | 5   | x           | 8        | 6   | x                           | D                    |   |
| 11  | <i>Acer campestre</i>                                | +                                 | -   | -           | -        | -   | -                           | x;D                  |   |
|     | <i>Herbaceous species and<br/>cutting sub-shrubs</i> | 23%                               |   |             |          |     |                             |                      | -erecting dominant<br>after clearing<br>of the forest<br>- erecting species<br>of cutting |
| 12  | <i>Epilobium angustifolium</i>                       | 2                                 | -   | -           | -        | -   | -                           | x;D                  |   |
| 13  | <i>Sambucus ebulus</i>                               | 1                                 | 8   | 6           | 5        | 8   | 8                           | M;D                  |   |
| 14  | <i>Fragaria vesca</i>                                | 2                                 | 7   | x           | 5        | x   | 6                           | F1                   |   |
| 15  | <i>Epilobium montanum</i>                            | +                                 | -   | -           | -        | -   | -                           | MF                   |   |
| 16  | <i>Rubus idaeus</i>                                  | 1                                 | 7   | x           | 5        | x   | 8                           | x;M                  |   |
|     | <i>Herbaceous lying fallow<br/>species Gramineae</i> | 30%                               |   |             |          |     |                             |                      |   |
| 17  | <i>Agrostis capillaris</i>                           | 2                                 | 7   | x           | x        | x   | 3                           | F3                   |   |
| 18  | <i>Holcus lanatus</i>                                | 1                                 | 7   | 5           | 6        | x   | 4                           | F2                   |   |
| 19  | <i>Anthoxanthum odoratum</i>                         | 1                                 | x   | x           | x        | 5   | x                           | F1                   |   |
| 20  | <i>Poa pratensis</i>                                 | 1                                 | 6   | x           | 5        | x   | x                           | F4                   |   |
| 21  | <i>Calamagrostis epigeios</i>                        | 1                                 | 7   | 5           | x        | x   | 7                           | x                    |   |
| 22  | <i>Dactylis glomerata</i>                            | +                                 | 7   | x           | 5        | x   | 6                           | F5                   |   |
|     | <i>Leguminosae</i>                                   | 3%                                |   |             |          |     |                             |                      |   |
| 23  | <i>Trifolium repens</i>                              | +                                 | 8   | x           | x        | x   | 7                           | F4;MF                |   |
| 24  | <i>Trifolium campestre</i>                           | +                                 | 8   | 5           | 4        | x   | 3                           | F2;M                 |   |
| 25  | <i>Trifolium pratense</i>                            | +                                 | 7   | x           | x        | x   | x                           | F4;MF                |   |
| 26  | <i>Lotus corniculatus</i>                            | +                                 | 7   | x           | 4        | 7   | 4                           | F4                   |   |
| 27  | <i>Astragalus species</i>                            | +                                 | 7-9   | 6-7         | 3-2      | 7-9 | 2                           | x;F1                 |   |
| 28  | <i>Vicia species</i>                                 | +                                 | 5-7   | 5-7         | 3-5      | x-5 | 2-5                         | F1-F3                |   |
|     | <i>Juncaceae-Cyperaceae</i>                          | 1%                                |   |             |          |     |                             |                      |   |
| 29  | <i>Juncus articulatus</i>                            | +                                 | 8   | x           | 9        | x   | 2                           | x                    |   |

| 0  | 1                             | 2 | 3   | 4 | 5   | 6   | 7   | 8    | 9 |
|----|-------------------------------|---|-----|---|-----|-----|-----|------|---|
| 30 | <i>Juncus effusus</i>         | + | 8   | 5 | 7   | x   | 4   | x;D  |   |
| 31 | <i>Carex leporina</i>         | + | 7   | 4 | 1   | 3   | 4   | x    |   |
|    | <i>Other species</i>          |   |     |   |     |     |     |      |   |
| 32 | <i>Lythrum salicaria</i>      | + | 7   | 5 | 8   | x   | x   | x;MF |   |
| 33 | <i>Hypericum perforatum</i>   | + | 7   | x | 4   | x   | x   | x;M  |   |
| 34 | <i>Achillea millefolium</i>   | + | 8   | x | 4   | x   | 5   | F2   |   |
| 35 | <i>Leontodon autumnalis</i>   | + | 7   | x | 5   | x   | 5   | F1   |   |
| 36 | <i>Leontodon ssp. asper</i>   | + | 7   | 7 | 3   | 7   | 3   | F1   |   |
| 37 | <i>Picris hieracioides</i>    | + | 8   | x | 4   | 8   | 4   | x    |   |
| 38 | <i>Aster species</i>          | 1 | 7-8 | 5 | 3-4 | 5-8 | 2-3 | x    |   |
| 39 | <i>Rumex obtusifolius</i>     | 1 | 7   | 5 | x   | x   | 7   | x    |   |
| 40 | <i>Plantago media</i>         | + | 7   | x | 4   | 8   | 3   | F1;M |   |
| 41 | <i>Logfia arvensis</i>        | + | —   | 7 | 4   | —   | 3   | x    |   |
| 42 | <i>Galeopsis tetrahit</i>     | + | 7   | x | 5   | x   | 7   | x    |   |
| 43 | <i>Prunella vulgaris</i>      | + | 7   | x | x   | 4   | x   | x    |   |
| 44 | <i>Euphorbia amygdaloides</i> | + | 4   | 5 | 5   | 7   | 6   | x;T  |   |
| 45 | <i>Cirsium vulgare</i>        | + | 8   | 5 | 5   | x   | 8   | MF;D |   |
| 46 | <i>Geum urbanum</i>           | + | 4   | 5 | 5   | x   | 7   | x;D  |   |
| 47 | <i>Galium aparine</i>         | + | 7   | 5 | x   | 6   | 8   | x    |   |
| 48 | <i>Urtica dioica</i>          | + | x   | x | 5   | x   | 8   | x;M  |   |
| 49 | <i>Lysimachia vulgaris</i>    | + | 6   | x | 8   | x   | x   | x    |   |
| 50 | <i>Campanula patula</i>       | + | 8   | 5 | 5   | 7   | 4   | x    |   |
| 51 | <i>Campanula persicifolia</i> | + | 5   | 5 | 4   | 8   | 3   | x    |   |
| 52 | <i>Tussilago farfara</i>      | + | 8   | x | 6   | x   | x   | x;M  |   |
| 53 | <i>Potentilla erecta</i>      | + | 6   | x | x   | x   | 2   | F1;M |   |
| 54 | <i>Senecio jacobea</i>        | + | 8   | 5 | 4   | 7   | 5   | xx   |   |

Annex 1  
Table 1

*Ecological and economic indicators of meadows flora (after I.A. Kovacs, 1974\*)*

### Ecological features

L = light

- 1 – plants of full shade
- 3 – shady plants
- 5 – plants of light and shade
- 7 – plants of light
- 9 – plants of full light

T = temperature

- 1 – in cold zones (boreal, arctic, alpine)
- 3 – in cool zones (montane, subalpine)
- 5 – in temperate zones (hilly, submontane)
- 7 – mostly in lukewarm zones (plains)
- 9 – in warm zones (Mediterranean)

U = soil moisture

- 1 – on very dry soils
- 3 – on dry soils

\*1 – After the Braun – Blanquet scale.

2 – After the indicators meadows flora – I.A. Kovacs, 1979; the significance of the indicators – Annex 1.

5 – on moderate moist soils

7 – on moist soils

9 – on moist – wet soils

10 – on flooded soils

R = soil reaction (pH)

1 – only on very acid soils

3 – mostly on acid soils

5 – on moderate soils

7 – on neutral soils

9 – only on neutral and basic soils

N = content of mineral and basic soils

1 – only on very poor in N. min. soils

3 – mostly on poor in N min soils

5 – on the soils with a moderate N min. content

7 – mostly on rich in N min. soils

8 – indicator of field N min. content

9 – only on exceeding rich in N min. soils, indicating the pollution

Observation: the digits 2, 4, 6 indicate the transgressive values between basic gradations 1, 3, 5, 7, 9; the sign „x" means the presence of the respective plant at more than 3 basic gradations of a factor – plant value can be named „indifferent".

### **Economic features (E)**

F = fodder plants

5 – excellent

4 – very good

3 – good

2 – medium

3 – mediocre

x – of no value

M = medicinal and aromatic herbs

MF = melliferous plants

T = toxic plants

D = injurious plants to the meadows (weeds, lingeous plants)



*Singnificat ecological characteristics for plant – soil correlation, economic value and species value and variation of Agrostis capillaris with diverse mesophyllous species meadow*

| Nr. | Species                         | Species characteristics *1 Species dominance *2 of the meadows tarried in various conditions of soil and ground declivity |    |             |          |  |   |  |  |                                 |
|-----|---------------------------------|---|----|-------------|----------|--|---|--|--|---------------------------------|
|     |                                 | ecological requirements given the soil  |    |             | economic | Brown luvic soil                       |   |  |  | Luvisol albic on plane surfaces |
|     |                                 | moisture  | pH | N – mineral |          | on the plane or little sloping grounds | with moderate erosion on the medium slope grounds | with progressive phenomena of compaction on plane surfaces | with pseudogley horizons on plane surfaces |                                 |
| 0   | 1                               | 2   | 3  | 4           | 5        | 6                                      | 7   | 8  | 9  | 10                              |
|     | <i>Graminaeae</i>               |   |    |             |          | 78%                                    | 83%   | 74%  | 75%  | 72%                             |
| 1   | <i>Agrostis capillaris</i>      | x   | x  | x3          | F3       | 4/50                                   | 4/60  | 3/45   | 3/45                                       | 4/52                            |
| 2   | <i>Festuca rubra</i>            | 5   | x  | x           | F3       | 2/15                                   | 2/15  | 2/28   | 2/20                                       | 2/16                            |
| 3   | <i>Festuca pratensis</i>        | 6   | x  | 6           | F5       | –                                      | –   | –  | +  | –                               |
| 4   | <i>Anthoxanthum odoratum</i>    | x   | 5  | x           | F1       | 1/8                                    | 1/5   | +  | 1/5  | 1/2                             |
| 5   | <i>Holcus mollis</i>            | –   | –  | –           | x        | 1/1                                    | –   | –  | –  | –                               |
| 6   | <i>Holcus lanatus</i>           | 6   | x  | 4           | F2       | –                                      | 1/1   | –  | 1/3  | +                               |
| 7   | <i>Cynosurus cristatus</i>      | 5   | x  | 4           | F3       | 1/1                                    | 1/1   | 1/1  | 1/1  | +                               |
| 8   | <i>Briza media</i>              | x   | x  | 3           | F1       | –                                      | 1/1   | –  | –  | +                               |
| 9   | <i>Phleum pratense</i>          | 5   | x  | 6           | F5       | –                                      | –   | –  | –  | +                               |
| 10  | <i>Nardus stricata</i>          | x   | 2  | x           | x;D      | –                                      | –   | –  | +  | +                               |
|     | <i>Leguminosa</i>               |   |    |             |          | 5%                                     | 2%  | 4%   | 3%   | 3%                              |
| 11  | <i>Trifolium pratense</i>       | x   | x  | x           | F4;MF    | 1/1                                    | +   | +  | +  | –                               |
| 12  | <i>Trifolium repens</i>         | x   | x  | 7           | F4;MF    | 1/1                                    | +   | +  | 1/1  | 1/2                             |
| 13  | <i>Trifolium dubium</i>         | 5   | 5  | 4           | F2;MF    | –                                      | –   | –  | –  | +                               |
| 14  | <i>Trifolium montanum</i>       | 3   | 8  | 2           | F3;MF    | 1/1                                    | –   | –  | –  | –                               |
| 15  | <i>Trifolium ochroleucon</i>    | 4   | 7  | 2           | F3;MF    | +                                      | –   | –  | –  | –                               |
| 16  | <i>Genista tinctoria</i>        | x   | 4  | 2           | x        | 1/2                                    | +   | +  | +  | +                               |
| 17  | <i>Chamaespartium sagittale</i> | 4   | 4  | 2           | x;D      | +                                      | –   | –  | –  | –                               |
| 18  | <i>Lotus corniculatus</i>       | 4   | 7  | 4           | F4       | +                                      | +   | +  | +  | +                               |
|     | <i>Juncaceae – Cyperaceae</i>   |   |    |             |          | 1%                                     | –   | –  | 2%   | 9%                              |
| 19  | <i>Luzula campestris</i>        | 4   | 3  | 2           | x        | +                                      | –   | –  | +  | +                               |
| 20  | <i>Juncus effusus</i>           | 7   | x  | 4           | x        | –                                      | –   | –  | –  | 1/7                             |
| 21  | <i>Juncus tenuis</i>            | 6   | 5  | 4           | x        | –                                      | –   | –  | –  | +                               |
| 22  | <i>Juncus articulatus</i>       | 9   | x  | 2           | x        | –                                      | –   | –  | +  | –                               |
| 23  | <i>Juncus bufonius</i>          | 7   | 3  | x           | x        | –                                      | –   | –  | –  | +                               |
| 24  | <i>Carex pallescens</i>         | x   | 4  | 4           | x        | +                                      | –   | –  | 1/1  | +                               |
| 25  | <i>Carex hirta</i>              | 6   | x  | 5           | x;D      | –                                      | –   | –  | +  | +                               |
| 26  | <i>Carex ovalis</i>             | 7   | 3  | 4           | x        | –                                      | –   | –  | +  | +                               |
|     | <i>Other species</i>            |   |    |             |          | 16%                                    | 15%   | 20%  | 20%  | 16%                             |
| 27  | <i>Achillea millefolium</i>     | 4   | x  | 5           | F2;M     | +                                      | 1/1   | 1/1  | +  | 1/2                             |
| 28  | <i>Leontodon autumnalis</i>     | 5   | x  | 5           | F1       | +                                      | 1/2   | 1/3  | 1/2  | 1/1                             |
| 29  | <i>Leontodon ssp. asper</i>     | 3   | 7  | 3           | F1       | +                                      | –   | 1/2  | +  | +                               |

| 0  | 1                              | 2 | 3 | 4 | 5     | 6   | 7   | 8   | 9   | 10  |
|----|--------------------------------|---|---|---|-------|-----|-----|-----|-----|-----|
| 30 | <i>Leontodon hispidus</i>      | 4 | x | 3 | F1    | -   | -   | 1/2 | +   | +   |
| 31 | <i>Centaurea phrigia</i>       | 5 | 5 | 3 | x;MF  | 2/5 | 1/5 | -   | 1/3 | +   |
| 32 | <i>Stachys officinalis</i>     | 4 | x | 4 | M;MF  | 1/3 | 1/3 | -   | +   | -   |
| 33 | <i>Prunella vulgaris</i>       | x | 4 | x | x     | +   | -   | 1/3 | 1/2 | 1/4 |
| 34 | <i>Prunella laciniata</i>      | 3 | 7 | 3 | x     | -   | -   | 1/1 | -   | +   |
| 35 | <i>Plantago media</i>          | 4 | 8 | 3 | F1    | +   | -   | 1/1 | -   | -   |
| 36 | <i>Plantago lanceolata</i>     | x | x | x | F2    | +   | 1/2 | 1/3 | 1/1 | +   |
| 37 | <i>Euphrasia stricta</i>       | 4 | x | 2 | x     | +   | +   | +   | +   | -   |
| 38 | <i>Euphorbia cyparissias</i>   | 4 | x | 2 | x     | -   | -   | 1/2 | 1/1 | -   |
| 39 | <i>Daucus carota</i>           | 4 | x | 4 | F2    | +   | +   | -   | -   | -   |
| 40 | <i>Polygala vulgaris</i>       | 5 | 3 | 2 | x;M   | +   | -   | -   | -   | +   |
| 41 | <i>Cichorium intybus</i>       | 4 | 8 | 5 | F1;M  | +   | -   | -   | -   | -   |
| 42 | <i>Potentilla erecta</i>       | x | x | 2 | F1;M  | +   | -   | -   | 1/1 | +   |
| 43 | <i>Pimpinella saxifraga</i>    | 3 | x | 2 | F1;MF | +   | -   | -   | -   | -   |
| 44 | <i>Crepis biennis</i>          | 5 | 6 | 5 | x     | +   | -   | -   | -   | -   |
| 45 | <i>Hypericum perforatum</i>    | 4 | x | x | x;M   | -   | -   | -   | -   | +   |
| 46 | <i>Hypericum maculatum</i>     | 6 | 3 | 2 | x     | +   | -   | -   | +   | -   |
| 47 | <i>Ranunculus bulbosus</i>     | 4 | 7 | 3 | x;T   | -   | -   | +   | -   | +   |
| 48 | <i>Ranunculus montanus</i>     | 6 | 8 | 6 | x;T   | +   | -   | +   | -   | -   |
| 49 | <i>Gladiolus imbricatus</i>    | 6 | - | 3 | x     | +   | -   | -   | -   | -   |
| 50 | <i>Astrantia major</i>         | 6 | 8 | 5 | x     | +   | -   | -   | -   | -   |
| 51 | <i>Galium verum</i>            | 4 | 7 | 3 | x     | -   | -   | -   | 1/1 | -   |
| 52 | <i>Galium mollugo</i>          | 5 | x | x | x     | +   | -   | -   | -   | -   |
| 53 | <i>Stellaria graminea</i>      | 4 | 4 | x | x     | +   | -   | +   | -   | -   |
| 54 | <i>Pteridium aquilinum</i>     | x | 3 | 3 | x     | +   | -   | -   | -   | -   |
| 55 | <i>Hieracium pilosella</i>     | 4 | x | 2 | x     | -   | -   | 1/1 | 1/1 | 1/1 |
| 56 | <i>Rumex acetosella</i>        | 4 | 2 | 2 | x;D   | -   | -   | +   | +   | +   |
| 57 | <i>Senecio jacobaea</i>        | 4 | 7 | 5 | x     | -   | +   | -   | +   | -   |
| 58 | <i>Inula britannica</i>        | 6 | x | 5 | x     | -   | 1/1 | -   | -   | -   |
| 59 | <i>Campanula patula</i>        | 5 | 7 | 4 | x     | -   | -   | -   | 1/1 | -   |
| 60 | <i>Dianthus armeria</i>        | 4 | 5 | 3 | x     | -   | -   | -   | +   | -   |
| 61 | <i>Rhinanthus minor</i>        | x | x | 3 | x;D   | -   | -   | -   | 1/2 | -   |
| 62 | <i>Veronica officinalis</i>    | 4 | 2 | 3 | x;MF  | -   | -   | -   | +   | 1/1 |
| 63 | <i>Veronica serpyllifolia</i>  | 3 | 5 | x | x;MF  | -   | -   | -   | -   | +   |
| 64 | <i>Lysimachia nummularia</i>   | 6 | x | x | x;M   | -   | -   | -   | -   | +   |
| 65 | <i>Stellaria graminea</i>      | 4 | 4 | x | x     | -   | -   | -   | -   | +   |
| 66 | <i>Dianthus carthusianorum</i> | 4 | 7 | 4 | x;M   | -   | -   | -   | -   | +   |

\*1 – Indicators of meadows flora, after I.A. Kovacs, 1979; the significance of the indicators in Annex1, Table 1.

2 – After Braun – Blanquet scale; covering degree / 1.

## **REZUMAT**

Abordarea fito-ecologică a cercetărilor, în zona piemontană din Culoarul Orăștiei, a luat în considerare trăsăturile generale ale acestui ansamblu teritorial și importanța diagnosticului ecologic, pentru gestionarea resurselor naturale.

Cercetările în arealul pajiștilor stabilizate și în condiții de tăietură au identificat și caracterizat tipul de pajiște *Agrostis capillaris* cu diverse specii mezofile, ca unitate sintetică relevantă pentru evoluția pe termen lung, a vegetației, calitatea substratului ecologic, nivelul general al producției, integralitatea mediului și amploarea impactului uman

Pe baza variațiilor spațiale ale compoziției floristice din pajiștile reprezentative și ale factorilor ecologici de substrat, s-a evidențiat influența semnificativă a particularităților edafice, la nivel stațional. Totodată, s-au adus precizări privind variabilele mediului, cu rol de referință în evaluările de ordin fito-ecologic: panta terenului, structura și textura solului, gradul de saturație în baze, volumul edafic util, nivelul trofic organic și mineral.

## **REFERENCES**

1. ANGHEL GH., RĂVĂRUȚ M., TURCU GH., 1971, Geobotanica, Ed. Ceres, București
2. CHIRIȚĂ C. and others, 1974, Ecopedologie cu baze de pedologie generală, Ed. Ceres, București.
3. DAVIDESCU VELICICA, DAVIDESCU D., 1978, Fertilizarea și limitele ei, vol. Protecția ecosistemelor, Comisia Națională pentru UNESCO, Complexul Muzeal de Științe ale Naturii, Constanța.
4. KOVACS I.A., 1979, Indicatorii biologici, ecologici și economici ai florei pajiștilor, Ministerul Agriculturii și Industriei Alimentare, București.
5. LONG. G., 1974, Diagnostic phyto-écologique et aménagement du territoire, Tome I-er, Principes généraux et méthodes, Masson et Cie Editeurs, Paris.
6. MANUGHEVICI ANA RODICA, 1981, Studiul geografic al Culoarului Orăștiei cu privire specială asupra problemelor de ecologie, teză de doctorat, Universitatea București.
7. PRODAN G., BUIA AL., 1961, Flora mică ilustrată a R.P.R., Ed. Agro-Silvică, București.
8. PUJA I, and others, 1978, Elemente de agroecologie, Institutul Agronomic Cluj-Napoca.
9. PUȘCARU-SOROCEANU E., POPOVA-CUCU ANA, 1965, Geobotanica, Ed. Științifică, București.
10. SIMTEA N., 1976, unele aspecte ecologice ale relației agricultură-pădure, vol. Omul și Agricultura, Casa corpului didactic a județului Hunedoara, Deva.

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