

THE MANAGEMENT OF MEADOWS WITH *ARNICA MONTANA*

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Arnica grasslands are generally far away from the farmhouses. They are located on slopes or on top of the hills. The access is exhausting and mowing difficult due to the rocky terrain. The soils are of a reduced fertility and the productivity of the grassland is low (Michler et al. 2004) Comparing the management activities in Arnica sites with more productive grasslands around the houses, the activities in Arnica sites are of lower intensity. The fertilization of Arnica grassland is done only with manure obtained from people's own households. It is applied in spring, in autumn and sometimes in winter. The grassland is used in a mixed way: a mixture of mowing and grazing is the most common management type, less common is to only graze the grassland and hardly ever is the grassland mown but not grazed. The mixed management, mowing the grassland in summer and grazing in autumn, is the most frequent one. Grazing only is realised especially in the southern part of Gârda village (Biharia). The grass is dried on the surface.

Keywords: *mountainous grasslands, Arnica montana, traditional management, fertilisation, grazing, mowing.*

Management activities of the farmers influence the species composition of the habitats and the abundance of *Arnica*. It is necessary to identify key activities to establish good management practices to maintain the habitat and flowering *Arnica*. Long-term traditional management of pastures and meadows, has generated a diverse landscape, deeply marked by the seasonal activities and by the living colours of the numerous plant species. The rich plant diversity is the result of extensive management activities by local people. The grassland management system is influenced in a characteristic way by the seasonal migrations of the local people (transhumance) to the communal, high-altitude pasture of Călineasa and by diverse management activities. Even within the communal area of Gârda, the management system differs from the northern region to the southern one. In order to maintain the *Arnica* habitats the maintenances of traditional grassland management is required. Otherwise, the grassland will be encroached by forest, actively reforested or used in a more intensive way. In the end, the species *Arnica montana* will disappear.

MATERIAL AND METHOD

Our research activity was performed in Gârda de Sus commune from Apuseni Mountains. The description of the management applied on *Arnica montana* grasslands has been made by using a questionnaire, which contains 79 questions and which was applied to 83 landowners. The questionnaire contains questions concerning the way of performing the care activities, the using way of grasslands and the harvesting of *Arnica montana* species. In this work only results regarding arnica meadows management will be presented. The questionnaire's application was performed in winter 2005-2006 and spring 2006.

RESULTS AND DISCUSSIONS

The result is summarized and documented as a seasonal work plan (Tabel 1).

Table 1

Seasonal work plan for *Arnica* habitats

	Month	Activity	Execution	Observations
Spring	March (the end)	Fertilising	For transport horse carts are used. Spreading is performed manually. The farmyard manure quantity applied on <i>Arnica</i> meadows is smaller than the one that is applied on meadows that are more productive.	The fertilizer quantities differ very much. The majority of landowners fertilize in spring (38 answers out of 60 possible ones, the others do not fertilize the land). In general, the farmyard manure is from cattle and horses. It is 6 months old and mixed with saw dust from wood processing and dried beech leaves which are used as litter in the stables. The manure is spread manually from small piles deposited by horse and cart.
	April	Gathering rocks	Manually	The rocks are frequently deposited in piles at the margin of the site.
	April	Controlling ants	Manually	
	April	Controlling wood growth	Manually	Mostly <i>Salix caprea</i> , <i>Sorbus aucuparia</i> and <i>Prunus spinosa</i> are eliminated.
	April	Crushing applied manure	A horse drags a branch, on which rocks are fixed to make it heavier.	This work is performed generally one week after the manure has been applied (valid for the ones that fertilize in spring). The crushing of manure applied in autumn is performed in spring. Rain determines when work starts.
	April	Gathering uncrushed remainings and beech leaves	Manually by rake	The gathering of un-crushed remaining is generally performed until one month after crushing. The uncrushed remainings are deposited in a pile on the area on which they have been gathered. Simultaneous with remainings, the dried beech leaves are gathered.
	May	Controlling weeds	Manually with scythe, reaping hock and knife	In general, the following species are eliminated: <i>Colchicum autumnale</i> , <i>Veratrum album</i> , <i>Pteridium aquilinum</i> and <i>Arctium lapa</i> . This work done regularly by only a quarter of the respondents (21 out of 83).
	May	Repairing damages caused by wild boars	Manually by hock or rake	The biggest damage is done on meadows. This work is done along the entire year as many times as necessary.
	May	Grazing	-	Some grasslands are grazed only in spring and in autumn (22 of 78 answers) others are grazed from spring to autumn (10 of 78 answers) and others only in autumn (38 out of 78 answers). The grazing is generally done by cattle and horses. The beginning of grazing is, in most cases, random.
Summer	June-July	Harvesting <i>Arnica</i> flower heads	Manually	

	Month	Activity	Execution	Observations
	July-August	Mowing of meadows	Manually	The Arnica meadows are mown a maximum of once a year at the end of the mowing period. First the locals cut productive meadows without Arnica, after the less productive ones with Arnica are cut. The mowing height is very low (2-3 cm from surface). The grassland remains sometimes unmown. Reasons for this are: - The grass is not needed because the locals have already enough from sites that are more productive. - The productivity of the grassland is too low to take the effort to cut it. - The owners didn't manage to cut the grass in time. - The owners are too old to do the exhausting job.
	July-August	Drying grass	Manually	The grass is dried on the surface. This method has a great disadvantage; the nutritional value of hay is quickly lost. However, this may be an advantage for Arnica as the seeds are well distributed in this way. The drying time of grass depends very much on the climatic conditions. It is very different from one area to another and less productive meadows have shorter drying times than more productive meadows.
Autumn	September-October	Grazing	-	The grazing is generally performed in autumn, when animals return from the communal pasture (38 out of 78 answers). The grazing is generally done by cattle and horses. The starting point is random. The grass's is about 5 and 10 cm high (estimated by owners). When winter (snow) comes, the grazing stops.
	October	Hay transport	By horse carts	After returning from the communal pasture, the hay is transported and deposited either in sheds, or in large hay stacks.
	October-November	Fertilization	The manure is transported by horse carts and spread manually. Arnica meadows are typically less fertilised than meadows without Arnica.	The quantities of fertilizer differ a lot. Some grassland owners apply the manure in autumn (31 out of 60 possible ones). After the transport, the manure is spread or deposited into piles. In spring, it is distributed on the surface and crushed later.

CONCLUSIONS

The management applied on *Arnica montana* grasslands from Gârda de Sus commune is a traditional one.

The care activities are only manually applied, among them the fertilisation with farmyard manure being the most important one.

The most frequent using system is the mixed one.

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