

# INTEGRATION OF PASTURE AND TREE MANAGEMENT IN MULTIPURPOSE SILVO-PASTORAL SYSTEMS IN ITALY

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## Summary

The Italian silvo-pastoral systems use mainly species that have been available for decades, with few exceptions. A large part of the Italian agriculture is based on subsidies and there is land abandonment, as a consequence farmers are slow to introduce new selected varieties in this period and many farms have not changed much the base of the genetic material, although research has produced new selected forage varieties and new clones of trees. On the contrary, the organization and the complexity of the pastoral system is experiencing extensive and rapid changes. The survival of many farms in marginal areas is possible thanks to subsidies and favoured by the development of services such as farm tourism, in-farm game hunting, in-farm sale of typical foods, in-farm education for school classes, in-farm medical and psychological care for retired and disabled people. The changes in the aim of silvo-pastoral systems make now necessary to adapt the management of traditional resources to the new aims. The possibilities of resource integration and management in modern pastoral systems is discussed in this paper. A general outlook of pasture and woody species used in temperate and Mediterranean silvo-pastoral systems is given, also taking into account some of the new functions that plants play into silvo-pastoral systems for multi-use of the territory. The combination of resources in systems is discussed on the basis of the number and type of resources. Examples of links of traditional resources with farm services and modern economy are discussed. Finally, laws that support the changes from traditional to complex agro-silvo-pastoral systems in Italy are introduced.

*Key words: Rural development, Agricultural services, Farm income diversification, Organic agriculture*

## Resumen

A pesar de que la mayor parte de la agricultura italiana está basada en el régimen de ayudas, aún existe abandono de tierras agrícolas. Como consecuencia, los agricultores han sido poco propensos a la introducción de nuevas variedades seleccionadas, manteniendo la mayoría de ellos la base del material genético. Esto es lo que ocurre con los sistemas silvopastorales, los que salvo algunas excepciones, están basados en especies que vienen siendo utilizadas durante décadas, a pesar de que la investigación ha generado nuevas variedades de especies forrajeras seleccionadas y nuevos clones de especies arbóreas. En cambio, la organización y la complejidad de los sistemas pastorales están experimentando un rápido y profundo cambio. La supervivencia de muchas explotaciones en zonas marginales sólo es posible gracias al régimen de primas, pero también al creciente número de nuevos servicios prestados dentro de las explotaciones, como son el turismo agrario, la caza mayor, la venta de productos tradicionales, programas educativos en granjas escuelas, y cuidados médicos y

psicológicos para mayores y discapacitados. Los sistemas agroforestales deben adaptar sus pautas de manejo tradicionales a estos nuevos objetivos. En este artículo se analizan las posibilidades de integración de recursos y manejo de los nuevos sistemas pastorales. Se da también un repaso general a las especies forrajeras y leñosas utilizadas en los sistemas silvopastorales templados y mediterráneos teniendo en cuenta algunas de las funciones nuevas que las plantas deben jugar en estos sistemas multifuncionales. La combinación de recursos es discutida en base al número y tipo de recursos. Se dan ejemplos de la conexión existente entre recursos tradicionales ligados a las nuevas formas de economía. Finalmente, se introducen algunas reflexiones sobre la legislación que podría apoyar los cambios desde sistemas tradicionales hacia sistemas más complejos.

Palabras clave: *Desarrollo rural, Servicios agrícolas, Diversificación de ingresos económicos, Agricultura orgánica*

## INTRODUCTION

The good quality of Italian crops and livestock is recognized, unfortunately the produce is not cheap on markets. Cheaper foods imported from overseas and free circulation of stocks within the European Union keep many farms in condition of economical marginality and their survival is possible thanks to subsidies. Italy shares this problem with other European Countries (DELGADO, 1992; ETIENNE, 1996; PAPANASTASIS, 1996; OLEA & VIGUERA, 1997).

Topographic and climatic constraints and poor soil fertility are serious problems to overcome, moreover rural people demand facilities and services similar to those available in towns but difficult to bring in mountains. Nonetheless of these problems, the existence of farms in marginal areas is extremely important for the safeguard of the territory and all efforts should be done to keep them.

An attempt to overcome market problems and contemporarily to conserve better the territory is done with the diffusion of organic agriculture. The number of organic farms in Italy is 49,859 (1.9% of the total) with an area of 1,067,102 ha (8.1% of the national agricultural area), they are more common in the south (MIPAF, 2005). In Central Italy, Tuscany has 1,555 organic farms (1.1% of the total) with an area of 101,239 ha (12.8% of the regional agricultural area) in the year 2006 (IRPET-ARISA, 2006).

New attempts to support agriculture come from the link of conventional rural activities with services such as nature tourism, farm tourism, in-farm education of school classes, in-

farm medical care for retired and disabled people. These services bring already large incomes to farms and rural areas, and they are favoured by diversity of vegetation and animal wildlife, integration of crops with livestock and forests.

This paper introduces: the forage and tree species available, the silvo-pastoral systems and new possibilities of their modernization, the laws that support these changes.

## AVAILABLE FORAGE SPECIES AND CULTIVARS

The forage species sown in Italian pastures and meadows are not changed very much in comparison to recent past. Research has selected varieties from local ecotypes (Table 1), however their seed is not easily commercialized due to the little market. Many seeds are imported from temperate Europe, United States and Australia, including Mediterranean species like *Festuca arundinacea* or *Trifolium subterraneum*. The seed of Italian genotypes promptly available on market is steemed 30% of the registered Italian varieties, with worse cases like Italian cultivars of subterranean clovers none of which is promptly available. In the meantime research overseas has selected new species and companies export their seed also in Italy.

## AVAILABLE TREE OR SHRUB SPECIES

The Italian silvo-pastoral systems comprise grazed native forests, association of pasture with trees and shrubs, agricultural plantations.

Forage species	Number of cultivars		Use in systems
	Registered in Italy	Italian genotype	
<i>Bromus catharticus</i>	1	0	Forage crop, mixed pasture
<i>Dactylis glomerata</i>	22	10	Forage crop, mixed pasture
<i>Festuca arundinacea</i>	25	12	Forage crop, mixed pasture
<i>Festuca rubra</i>	8	1	Pastures, cover crop
<i>Festuca pratensis</i>	5	2	Pastures, cover crop
<i>Hedysarum coronarium</i>	6	6	Forage crop, pastures
<i>Lolium italicum</i>	68	35	Forage crop
<i>Lolium perenne</i>	31	9	Forage crop, mixed pastures, cover crop
<i>Lotus corniculatus</i>	11	6	Pastures
<i>Medicago sativa</i>	162	70	Forage crop,
<i>Onobrychis vicifolia</i>	10	7	Forage crop, mixed pastures
<i>Phleum pratense</i>	8	3	Forage crop, mixed pastures, cover crop
<i>Poa pratensis</i>	9	2	Pastures, cover crop
<i>Trifolium alessandrinum</i>	25	21	Meadow
<i>Trifolium repens</i>	19	6	Forage crop, mixed pastures, cover crops
<i>Trifolium incarnatum</i>	24	16	Forage crop
<i>Trifolium resupinatum</i>	16	8	Forage crop
<i>Trifolium pratense</i>	23	15	Forage crop, mixed pastures, cover crop
<i>Trifolium subterraneum</i>	4	4	Pastures, cover crop

**Table 1.** Forage species commonly sown in Italy, number of registered cultivars, number of Italian genotypes, their use in pastoral systems

Grazed native forests comprise some needle leaves (mainly *Larix decidua* in the Alps; *Pinus pinea*, *P. pinaster* in the Mediterranean) and broadleaves (*Castanea sativa*, *Fagus sylvatica*, mixed oak forests in the temperate area; *Q. cerris*, *Q. pubescens*, *Q. ilex*, *Q. suber*) and shrubs of the maquis in the Mediterranean area (TALAMUCCI et al., 1996). Some forests were thinned out or converted from coppices to high stand or to park forest in order to reduce tree density and increase herbs production (STAGLIANÒ et al., 1997).

Associations of pasture and trees or shrubs comprise forage, timber, multipurpose and agricultural plantations. Forage plantations are not common but they are present in scattered farms. Important shrub species are *Atriplex* spp., *Morus alba*, *Opuntia ficus-indica* (TALAMUCCI, 1994; STRINGI & GIAMBALVO, 1996). Timber is got from fast growing species (*Populus* hybrids), softwoods (mainly *Pinus* spp.), hardwoods (*Castanea sativa*, *Juglans regia*, *Prunus avium*, *Quercus* spp.). Multipurpose plantations comprise wind-

breaks (mainly done with *Cupressus sempervirens*, *Pinus* spp., *Populus* spp.) and green fences grazed in summer (*Atriplex* spp., *Opuntia ficus-indica*).

Agricultural plantations associated with pasture or cover crops are vineyards, olive groves, fruit plantations, grazed in particular periods of the year (PIEMONTESE et al., 1997).

## PASTORAL SYSTEMS THAT ASSOCIATE TREES

Pasture and trees are combined in diversified agro-silvo-pastoral systems that comprise traditional and modern management (CERETI & TALAMUCCI, 1991). Because of the variability of systems, many classifications have been proposed but they are not exhaustive (PARDINI & ROSSINI, 1997, TALAMUCCI & PARDINI, 1999). Some classification arising from literature are based on the economic importance of pasture and

Tree species	Area (ha)	Grazed components of the understore
<i>Abies alba</i>	22.726	Sparse herbs and shrubs in forests
<i>Castanea sativa</i>	275.395	Sparse herbs and shrubs in nut harvested forests
<i>Fagus sylvatica</i>	260.295	Sparse and shrubs in thinned out forests
<i>Juglans regia</i>	4.000	Native or sown sward in timber plantations
<i>Larix decidua</i>	102.319	Pasture or pastures with scattered trees
<i>Picea abies</i>	141.086	Sparse herbs and shrubs in forests
<i>Pinus</i> spp.	362.126	Sparse herbs and shrubs in thinned out forests
<i>Populus</i> spp.	117.549	Native or sown sward in fast growing plantations
<i>Prunus avium</i>	30.402	Native or sown sward in timber plantations
<i>Q. cerris</i>	57.333	Shrubby leaves and pasture in thinned out forests
<i>Q. petraea</i>	19.430	Shrubby leaves in thinned out forests
<i>Q. suber</i>	98.862	Shrubby leaves and pasture in thinned out forests
<i>Other oaks.</i>	103.638	Shrubby leaves or pasture in thinned out forests

**Table 2.** List of tree species that form grazed forests in Italy, land area (ISTAT, 1994), associated grazed understore

trees; the intensity of grazing on shrubs; the season of tree-shrub grazing; the density of trees; the spatial disposition of trees and shrubs, they all point out the extreme variability of land uses integrated in the agro-silvo-pastoral systems in Italy. An easy classification proposed recently is based on the number and type of resources that determine the level of complexity of the system (PARDINI, 2006a; 2006b) suggests that an increased system complexity can contribute to new valorization of rural areas especially by favouring the link of traditional agriculture and services.

## POSSIBILITY OF NEW VALORIZATION

Conventional agriculture systems are present all over the peninsula, encircled by market problems and helped by subsidies. There are also many examples of management aimed to income diversification, for example in the average of the period 2000-2004 the Italian farms have got yearly subsidies for 11,200,000,000 Euro, whilst in the year 2006 Italy had 15,700 agro-tourism farms, 12,000,000 day-presences that generated 410,000,000 Euros incomes (3.7 of the subsidies) and 883 millions adding the farm yearly turn-over (AGRITURIST, 2006) that is the 7.9% of the subsidies.

These changes have brought to recognise the importance of the “connected activities” added

for the first time (D.LGs., 2001) to the traditional agriculture, animal rearing and forestry. The law specifies that these connections include services based on farm resources. The cases are diversified and scattered but already very common, and I can give some examples:

Service herds moved on trucks from the Mediterranean to graze pastures of some alpine Municipalities to keep land beauty and favour tourism. This system exists thanks to the integration of pastures and thinned forests available in distant part of the territory.

Livestock adoption. Attempts to reintroduce native breeds in marginal area are favoured By livestock “adoption” including cattle, sheep, goats, pigs. Also honey bee hives can be adopted to start honey farms (DE ANGELIS, 2007). Customers cover some costs of livestock management and they own part of the milk, cheese or meat, the farmer owns the calves (ABI, 2007; BIOAGRITURISMO, 2007; GAL VALSUGANA, 2007; IL ROVERETO, 2007). This system is useful to recover abandoned pastures and native livestock breeds.

Adopt a chestnut tree. Chestnut is a valuable food but its harvesting is not economically convenient. The maintenance of productive beautiful forest is favoured by trees “adoption”. Customers give money for tree management and in change get part of the produ-

ce (ACG, 2007; INFOAPPENNINO, 2007). Such chestnut forests can also be grazed.

Typical foods. These have unconventional tastes that people prefer to supermarket foods. Their guarantee of quality comes from the natural conditions of farming or livestock rearing. Typical foods have an important added value and they can be bought in the farm also with booking via web. People prefer little quantities of native crops or animal breeds, this, in turn, favour the diversification of farm products.

Farm tourism. Although the law limits incomes from services in comparison to those from agriculture, many farms could get more incomes from restoration, bedding and services than from traditional agriculture. The services available depend of the typology and organization of the farm, normally they comprise just food, bedding, and guided trekking by foot, horseback riding or four wheel drives (ZAVALLONI & ZAVALLONI, 2001).

Educational farms are not regulated by national law, however there are regional laws especially in North and Central Italy. Commonly these farms have organized just guided tours for school classes about important aspects of environmental protection, food cropping, animal rearing. There are cases of *farm gardens* with officinal and medical plants that have been started after agreement with local schools and they are kept with the help of students. In the year 2007 there are 301 educational farms registered in Emilia Romagna. Other cases concern *in-farm-therapy* and *horse-therapy* that are considered "social agriculture", farms that have agreements with local medical services and accept customers that need some easy body training (like retired or disabled people) or psychological care, in 2003 there were 50 farms involved in such agreements in Tuscany.

The diversity of approaches point out that changes are needed and that Italian farmers are seeking new ways to make their farms survive. How agriculture can develop profitable links to services has still to be understood, however the diversification of farm resources and the inte-

gration of crops, livestock and forestry will favour the changes, this, in turn, suggests to support the passage from simple to complex and integrated agro-silvo-pastoral systems. Any new system should have regional or even local appliance, in fact the diffusion over a large area would somehow contrast with the concept of sustainability.

## LAWS TO SUPPORT MANAGEMENT CHANGES

The complex systems fit very well with the definition of agroforestry that is: "... a collective name for land use systems and practices in which wood perennials are deliberately associated with crops and/or livestock on the same land management unit, in spatial mixture or temporal sequence" (ICRAF, 1993; HUXLEY & VAN HOUTEN, 1997).

On the base of the European law (Reg. CE 1257/1999), the Region Tuscany approved the Rural Development Plan 2000-2006 to support the management of agricultural land also for environmental protection, landscape beauty and wildlife conservation. It has subsidises the passage of cropped fields over 30% slope to permanent sward or pasture, the planting of timber trees and energy biomass plantations on previous cropped fields, the increase of biodiversity with plantation of windbreaks and hedges on field and pastures perimeters.

The new Rural Development Plan 2007-2013 of Tuscany, based on the Reg. CE 1968/2005, confirms and details better the actions started with the previous plan, it supports organic and integrated farming and the management of agricultural land also for environmental protection, landscape beauty, conservation of genetic resources and biodiversity. Subsidies are given for the passage of cropped fields on slopes over 20% to permanent sward or pasture, for the improvement of pasture management, for plantations of timber trees, for timber rows in pastures or cropped fields, for anti-pollution trees nearby water streams, for development of truffles forests, for energy biomass tree plantations, and for planting of new forests.

## CONCLUSIONS

The variability of the Italian territory has limited the development of rural areas for long time. However it has also helped to maintain the beauty of the landscape. This, in turn, can now help to valorise the territory by links of agriculture and modern services. The variability of land uses and the integration of forest, pasture and crops, as well as trees and shrubs in pastures and on the perimeters of cropped fields are all useful to this kind of development.

Concerning plants: a database of the environmental ranges in which cultivars fit (rainfall, pH, soil texture, management) will help the introduction of selected ecotypes in the agro-silvo-pastoral systems, and consequently their commercialization. A national database of adaptation ranges should be made available to farmers.

Concerning silvo-pastoral systems: rural planning should maintain the diversification of land uses, increasing rationality of the spatial distribution of fertile areas with intensive management, nitrogen sensitive areas with low inputs, marginal areas with low inputs and development of services connected to agriculture, and other areas left to guided forest reintroduction and wildlife conservation.

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