

Researches on the Induced Modifications in the Vegetation of Historical Gardens : Villa Demidoff at Pratolino and the Vegetation of the Appennino Area

Abstract

The park of the Medici Villa at Pratolino was conceived and laid out between 1569 and 1584 to a design by Bernardo Buontalenti. European designers of gardens followed it as a model throughout later centuries.

Thanks to documents and illustrations of the period we are now able to reconstruct the spatial distribution of the vegetation ; for the most part we even know the species that grew in the different parts. After the Restoration, Pratolino was completely redesigned by Joseph Friecks and transformed into a landscaped garden, which is how it came down to us.

This paper examines the alterations undergone by the vegetation in its transformation from Buontalenti's original Italian-style garden to the present-day park, especially in the light of the changes designed by Friecks, dating from the age of Romanticism. To this end, the inventory of the existing trees is compared with the lists that can be inferred from historical documents.

Special attention is paid to the results of a research study on the composition of the flora and its spatial distribution in the area immediately surrounding (and including) Giambologna's statue restoration project. The results also shed light on the design work of Buontalenti and Friecks. Using an elementary 2×2 m grid, the study has taken the following parameters into consideration : 1. flora inventory, 2. numbers, 3. proportions and quantities of tree, shrub and herbaceous growth, 4. size and position of trees, shrubs, coppices and root suckers measuring more than 2.5 cm in diameter, inventory of tree and shrub plantlets and seedlings.

INTRODUCTION

In 1569 the Grand Duke of Toscana, Francesco I de' Medici, engaged the architect Bernardo Buontalenti with the task of designing and overseeing the construction of a villa with a park on the hills behind Fiesole. Ever

since these stately gardens were first completed, they began to attract the interest of experts; over the centuries a great deal has been written about the park and the important role played by Pratolino in the history of European gardens. In this paper it is our intention to:

- examine some aspects of the qualitative and quantitative changes affecting the trees and shrubs, from Buontalenti's formal garden to the present day, bearing in mind that the park has experienced long periods of obsolescence and that in the first half of the 19th century it was completely redesigned following the models of Romantic landscape gardens;
- discuss the methods used in a floristic and structural survey of the vegetation and the results obtained. The study was done in a restricted area, but one of great aesthetic importance, which is in a way emblematic of the entire park: the area where Giambologna constructed his statue of the Appennino in 1579-80.

Briefly, the most important events in the history of the Villa at Pratolino are listed in the chronology in table 1.

METHODS

A. Modifications affecting the park's dendrological component

Literary, archival and iconological sources were consulted. Most of the relevant information can be found in the specific reviews and research studies, which also contain bibliographies and illustrative material.

B. Study of the vegetation in the area around the statue of the Appennino

The surface examined in the study is that around the Appennino: it is bordered by a ring of shaded avenues and includes the statue itself, the ponds, a patch of woodland (high forest) and two meadows. The area is elliptical, fairly flat but with an irregular morphology (Fig. 1).

The area covered by this survey (a total of about 5500 square metres) was divided up according to a 2×2 m grid (Fig. 2). The study included: (1) floristic inventory (except the wood near the Chapel); (2) positioning, measurement of diameter and height of trees (defined as plants with a d.b.h. of at least 5 cm); (3) positioning and measuring of plants with a diameter between 2.5 and 5 cm (at the collar); (4) positioning and sizing of living coppices and of the area covered by root suckers; (5) counting suckers present in shrubs and measuring of suckers with diameter at collar of at least 2.5 cm; (6) positioning, measuring and identification of dead coppices according to morphological features of bark and wood; (7) census of sexual reproduction in shrub species; (8) census of sexual reproduction

TABLE 1 — CHRONOLOGY OF THE MAJOR EVENTS IN THE HISTORY OF THE VILLA AT PRATOLINO

1568 :	Francesco I de' Medici buys the Pratolino estate from Benedetto Uguccioni.
1569 :	Francesco I de' Medici commissions Bernardo Buontalenti to design the villa and the gardens.
1584 :	Buontalenti's project is almost completed.
1587 :	Francesco I dies.
1588-1737 :	Medici period. The park undergoes maintenance operations and only extremely localized alterations take place (remodelling of Prato degli Uomini Veri in the late 17th century, commissioned by Grand Prince Ferdinand).
1737 :	Beginning of Lorraine period (1737-1859).
1737-1791 :	The Lorraine rulers (Franz Stephen and Peter Leopold) show no interest in Pratolino. The gardens are abandoned and all works of art in it fall into disrepair.
1791-1799 :	Ferdinand III has the gardens restored.
1799-1815 :	Napoleonic period.
1815 :	Ferdinand III returns to Florence as ruler of Tuscany.
1818 :	Ferdinand III entrusts Joseph Frietsch from Bohemia with the task of restructuring the park.
1822 :	The main part of the restructuring operations are completed and Pratolino is transformed into a landscape park.
1824 :	Ferdinand III dies.
1824-1872 :	Another period of abandonment for the gardens.
1872 :	Paul Demidoff buys the villa and the park at Pratolino and begins to restore the property.
1872-1955 :	Period of Demidoff ownership.
1955 :	Maria Demidoff dies and the estate is inherited by the Karageorgevich family : the woods in the upper portion of the park are destroyed.
1963 :	The estate is sold to a company, the Società Generale Immobiliare, which attempts to break it up into smaller holdings and eventually turns it into a farm : the park is used as pastureland for cows and horses.
1981 :	The estate is bought by the Provincial Administration of Florence which embarks on a series of renovation projects.

in arboreal species ; (9) estimate of herbaceous plant cover ; (10) estimate of shrub species cover ; (11) estimate of arboreal species cover. Data were gathered on especially designed forms ; the diameters were measured with a dendrometric caliper and the heights with a Blume-Leiss hypsometer. For the nomenclature we followed the usage in *Flora d'Italia* (Pignatti, 1982). The area studied was subdivided into seven subareas according to the prevalent ecological requirements of plants.

— On the southern side the central section is covered by the ponds. For the sake of our survey we have called the part nearest the Appennino

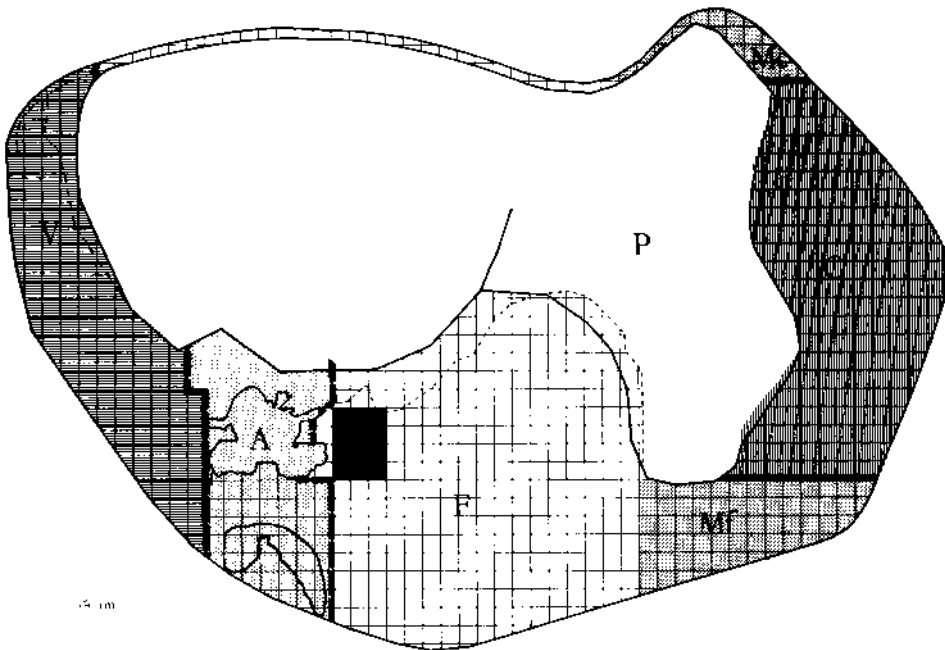


Fig. 1. The different areas and the grid system. P: The pond; A: The Appennino area; V: Wood near the Villa; F: Wood near the Farm; C: Wood near the Chapel; MC: Meadow near the Chapel; MF: Meadow near the Farm. Black area is detailed in fig. 7.

the « Buontalenti Pond » and the righthand part, dating from the later remodelling, the « Frietsch Pond ». The first pond always has water in it, whereas at the time the survey was made the second was considerably silted up and remained without water for long periods during the year. As a result, the presence or absence of water led to the development of two different plant populations.

- In our survey the term « Appennino Area » refers to the area directly affected by the restoration project: the statue, the plinth, the rocaille and the entrance to the lower grotto. This is the most complex zone, where the influence of man has been most strongly felt and where rocky areas and steep inclines alternate with flatter areas and ones covered over with earth.
- The woodlands cover the higher altitude sections: in the survey these areas were also separated from the rest, in order to give a clearer description of the exposure and morphology of the land. These areas have been called « Wood near the Villa », « Wood near the Farm » and « Wood near the Chapel ».
- There are also two small meadows, quite separate from each other, the « Meadow near the Chapel » and the « Meadow near the Farm ».



Fig. 2. A view of the basic grid (2 × 2 m) from the head of Appennino statue.

In the survey we identified all the stems which could be related to a common origin and referred to this as a « coppice area ». We performed a census of all higher plants and also of Pteridophyta present during the survey (begun in late autumn and completed in early spring). This chronological limitation means that the survey does not include those herbaceous species which were not visible at the time. Since there were no objective reference parameters we were left with a number of taxa of doubtful interpretation (12.7 % of all taxa), which we defined only in terms of their genus. Note that renovation and restoration work began after our survey was completed, and that many species, primarily the herbaceous ones, underwent alterations of many sorts, including changes in their qualitative composition.

The numbers of individual plants and their habits were indicated with specific symbols, and the results obtained were processed and indicated with symbols on the plans.

The degree of plant cover was expressed according to the index suggested by Pignatti (1952), slightly modified, consisting of the following scale: 0: absence of cover; r: negligible cover; +: less than 1 % cover; 1: between 1 and 20 % cover; 2: between 21 and 40 % cover; 3: between 41 and 60 % cover; 4: between 61 and 80 % cover; 5: between 81 and 100 % cover (Fig. 3).

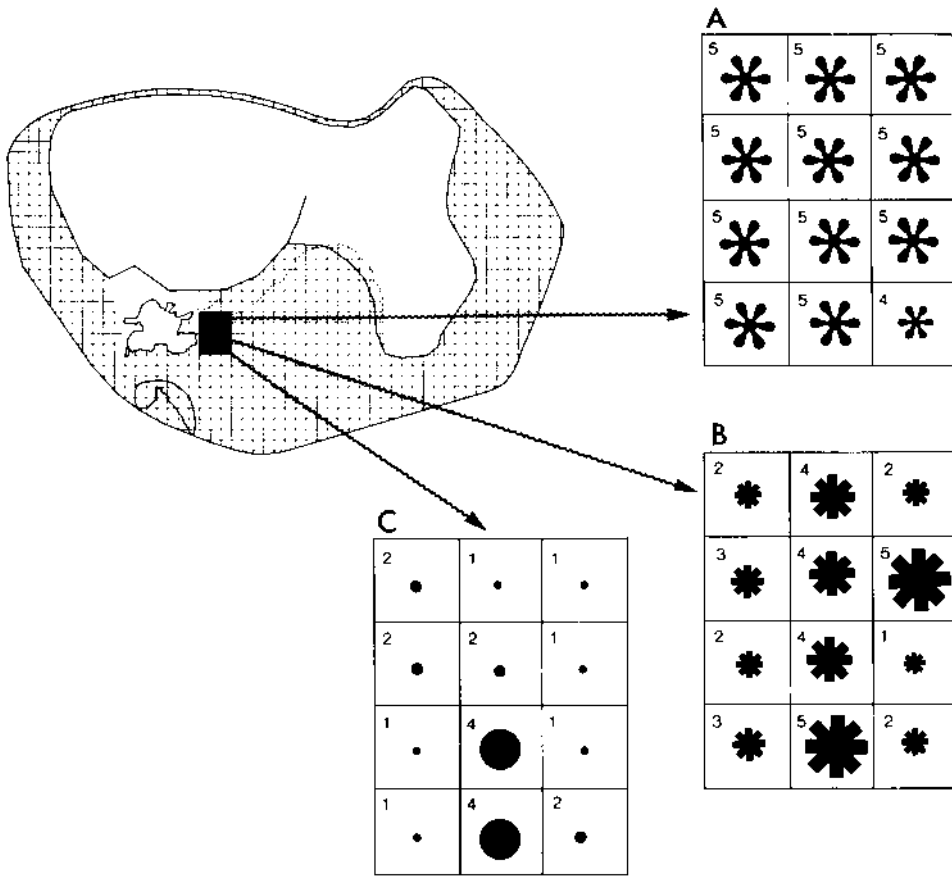


Fig. 3. Ground cover of total area (explanations of classes in the text) A: cover by trees; B: cover by shrubs; C: cover by herbs.

THE PAST VEGETATION

In an entry dated 22 November 1577, the ledgers of the Capitani di Parte record the planting of new trees, including fruit-bearing species (cotogni and nesti), evergreens (allorj), ornamental plants (melagranj), deciduous shrubs and trees (nuccioli and faggi), and conifers (abeti). We learn from other sources (De Vieri, 1586; Codice Barberiniano Lateranense, 1588) that a few years later the most impressive feature were the fir woods. Silver firs grow spontaneously in the Apennine region (and were therefore a familiar species) and this species had already been cultivated as early as the Middle Ages by monastic orders: a few miles from Pratolino, around the monastery on Monte Senario, there were extensive cultivations of silver fir.

In 1586 Ulisse Aldrovandi, describing the wonders of Pratolino, states « *Abietum nemus ubi etiam piceae* » (Aldrovandi, 1586). From this statement we learn that Norway spruce had been planted, although sporadically (etiam); in the same piece he also reports on the existence of larch trees (« *Larices ex montibus Tridentinis allatae* »). There is no reason to be surprised at this use of Norway spruce because, in a formal garden, evergreens were used to create a static composition; and Agostino del Riccio (1596), in a long list of trees (*piante che tengono le fronde sempre, verno e state.. that keep their leaves always, summer and winter alike*), includes Norway spruce (*pezzi*). What is unusual is the presence of the larch (a deciduous species).

Buontalenti's garden is constructed around the basic pattern of the silver firs; the most remarkable feature is the fact that these trees are not suited for pruning and trimming, so that the formal garden remains qualitatively static but changes shape as the trees grow; neither their height nor their width can be reduced and, gradually, the silver fir « *insula* » takes on a wild appearance. The pattern constructed around the silver fir stands remained unaltered throughout the Medici period, as we learn from a number of iconological sources. When the Lorraine dynasty took over as the new rulers of Tuscany, Pratolino was totally neglected, until eventually it was turned over to the Congregazione di San Giovanni Battista in 1782; they used the villa to house a canvas and cord factory, « *Fabbrica di Tele, Canapini e Cordaggi* » (Zangheri, 1979).

It was not until the 1790s that anyone at the Florence Court showed a renewed interest in the park. Ferdinand III, fascinated by the history and the beauty of Pratolino, decided to restore the gardens and commissioned a series of surveys and studies. In 1798 Giuseppe Manetti reported to the Grand Duke on the conditions of the park (Manetti, 1798) giving a detailed description of the vegetation: this report reveals that misguided maintenance policies and total neglect had damaged primarily the silver firs. In just a few decades the formal garden had been totally transformed, but Manetti, who was already feeling the influence of Romanticism, did not find the changes displeasing and actually marvels at the interesting alterations.

In 1818 Joseph Frietsch, who had come to Florence with Ferdinand III after the Restoration, began work on the garden. His efforts totally changed the composition of the park, giving rise to the basic structure of the landscape garden which we see today.

THE ACTUAL VEGETATION

Currently, the gardens at Pratolino (which are now commonly and correctly referred to as the park of Villa Demidoff) cover an area of about 160 hectares, at altitudes ranging from 327 to 541 m. The vegetation (Gellini

and Grossoni, 1985) consists of three main types influenced by the conditions (altitude, soil and climate) and by human activities.

The first is characterized by mesophilic vegetation, especially *Quercus robur* L. and *Q. cerris* L., as well as *Acer campestre* L., *Carpinus betulus* L., *Castanea sativa* Mill., *Fraxinus ornus* L., *Laburnum anagyroides* Med., *Ostrya carpinifolia* Scop., *Prunus avium* L., and it is located mainly in the upper part. In the second type we find the same species listed above but the pattern has been altered by the presence of exotic species and many more « anthropized » plants, several evergreens and many trees with marked xerophile characteristics (*Cedrus deodara* G. Don, *Laurus nobilis* L., *Platanus hybrida* Brot., *Quercus pubescens* Willd., *Sorbus torminalis* Crantz, *Viburnum tinus* L., etc.). This vegetation is mostly present in the central portion of the park. At the end, in the lower section there is a xerophilous coppice (*Quercus pubescens* Willd., *Pinus nigra* Arn.), with occasional individuals of the species listed above. In the early 1960s the entire upper portion of the wood was felled for profit, allowing the aggressive black locust to take over and now *Robinia pseudacacia* occupies more than 7 ha.

The wooded areas alternate with meadows, which for the most part are what is left of the meadows designed by Frietsch. The anthropogen change that contributed most to the formation of the three different vegetation types was the decision made by the Demidoff family to modify Frietsch's project by surrounding the villa with a greater number of evergreens.

After the death of the last Demidoff, in the late 1950s, a number of coniferous trees were grown in the central and upper portions of the park, including *Calocedrus decurrens* Flor., *Pinus nigra* Arn., *P. strobus* L. and *Pseudotsuga menziesii* Franco. This last species was particularly favoured because it grows so rapidly but already its pyramid-like crown is altering the Romantic landscape, based on the round crown of oaks.

The inventory has enabled us to draw up a chart of the trees and shrubs in the park. Considering both spontaneous (indigenous or naturalized) elements and those of anthropogen origin, our findings show that there are 131 taxa present, including 86 trees, 35 shrubs and 10 climbing vines (Gellini and Grossoni, 1985).

THE VEGETATION OF THE APPENNINO AREA

Analysis

As part of the restoration project carried out by the Soprintendenza ai Beni Artistici ed Ambientali for the provinces of Firenze and Pistoia we



Fig. 4. The Appennino by Giambologna surrounded by trees.

have investigated the vegetation growing in the area immediately around the statue of the Appennino. This survey was undertaken in order to determine the quantitative and qualitative nature of the flora while the dynamics of the arboreal vegetation was studied through the analysis of coppices (intact or decomposing) and seedlings. At a later stage, the results obtained were compared with the iconological sources available.

In the garden designed by Bountalenti the sculptural complex of the Appennino played a role of prime importance, in terms of both content and form, since it was the central element of the park uphill from the main building and was also the connective element between the locus of the Gods (statue of Zeus) and the locus of the lord and master (the villa). The structural distribution of the vegetation around the Appennino was very simple: the semi-circular pond bordered on the Prato degli Uomini Rari, whereas the other sides of the statue were all surrounded by silver firs.

The remodelling during the Romantic period completely changed this structure, but already a few decades after some alterations were made. The labyrinth disappeared and the Zeus-Appennino structure was altered by the addition of a tripartite pathway system. Towards the end of the 17th century the huge niche behind the Appennino collapsed and Foggini was called upon to restructure the entire area.

The disappearance of the niche first, and the « naturalization » of the pond later, further accentuated the role of the vegetation in defining and delimiting the space of the Appennino (Pozzana, 1986; Zangheri, 1988) (Fig. 4).

TABLE 2. — TOTAL PLANT INVENTORY

SPECIES	FAMILY	AREA	FREQ	HAB
<i>Acer campestre</i> L.	Aceraceae	ABCEFG	3	STR
<i>Acer pseudoplatanus</i> L.	Aceraceae	F	r	R
<i>Achillea millefolium</i> L.	Compositae	A	r	H
<i>Agrimonia eupatoria</i> L.	Rosaceae	ACG	r	H
<i>Agropyron repens</i> Beauv.	Graminaceae	FG	1	H
<i>Agrostis stolonifera</i> L.	Graminaceae	ACG	1	H
<i>Ajuga reptans</i> L.	Labiatae	ABCEFG	7	H
<i>Alchemilla</i> sp.	Rosaceae	C	r	H
<i>Allium vineale</i> L.	Liliaceae	A	1	H
<i>Anagallis arvensis</i> L.	Primulaceae	CFG	1	H
<i>Anthriscus</i> sp.	Umbelliferae	ABF	3	H
<i>Arisarum vulgare</i> Targ. Tozz.	Araceae	ABCF	1	H
<i>Artemisia verlotorum</i> Lamotte	Compositae	AF	1	H
<i>Arum italicum</i> Miller	Araceae	ABCEF	3	H
<i>Asplenium trichomanes</i> L.	Aspleniaceae	AG	3	H
<i>Avena fatua</i> L.	Graminaceae	AC	3	H
<i>Bellis perennis</i> L.	Compositae	ACG	5	H
<i>Bidens tripartita</i> L.	Compositae	EF	5	H
<i>Blackstonia perfoliata</i> Hudson	Gentianaceae	BC	3	H
<i>Brachypodium pinnatum</i> Beauv.	Graminaceae	ABCEFG	7	H
<i>Brachypodium silvaticum</i> Beauv.	Graminaceae	ABCFG	3	H
<i>Bromus erectus</i> Hudson	Graminaceae	CG	3	H
<i>Bromus sterilis</i> L.	Graminaceae	ACF	3	H
<i>Buglossoides purpureoacerulea</i> I.M. Johnston	Boraginaceae	A	1	H
<i>Buxus sempervirens</i> L.	Buxaceae	ABF	1	ST
<i>Campanula</i> sp.	Campanulaceae	AFG	r	H
<i>Campanula trachelium</i> L.	Campanulaceae	EF	r	H
<i>Cardamine pratensis</i> L.	Cruciferae	A	1	H
<i>Carex pendula</i> Hudson	Cyperaceae	ACEFG	7	H
<i>Celtis australis</i> L.	Ulmaceae	A	r	S
<i>Centaurea</i> sp.	Compositae	ACEFG	3	H
<i>Centaurea jacea</i> L.	Compositae	C	5	H
<i>Centaureum erythraea</i> Rafn.	Gentianaceae	F	r	H
<i>Cerastium</i> sp.	Caryophyllaceae	CFG	1	H
<i>Ceterach officinarum</i> DC.	Aspleniaceae	ADE	3	H
<i>Chelidonium majus</i> L.	Papaveraceae	A	r	H
<i>Chenopodium album</i> L.	Chenopodiaceae	F	r	H
<i>Cirsium vulgare</i> Ten.	Compositae	BF	1	H
<i>Clematis vitalba</i> L.	Ranunculaceae	ABCDEFG	7	V
<i>Conyza canadensis</i> Cronquist	Compositae	F	1	H
<i>Convolvulus arvensis</i> L.	Convolvulaceae	AB	r	H
<i>Cornus sanguinea</i> L.	Cornaceae	ABCEF	5	SR
<i>Crataegus monogyna</i> Jacq.	Rosaceae	BCEF	3	SR
<i>Crataegus oxyacantha</i> L.	Rosaceae	ABCEFG	5	SR
<i>Crepis</i> sp.	Compositae	C	1	H
<i>Cyclamen hederifolium</i> Aiton	Primulaceae	ABCEF	7	H
<i>Cymbalaria muralis</i> Gaert., Mey. et Sch.	Scrophulariaceae	AF	5	H
<i>Cynodon dactylon</i> Pers.	Graminaceae	ACDEF	3	H
<i>Dactylis glomerata</i> L.	Graminaceae	ACFG	3	H

Daphne laureola L.	Thymelaceae	ABF	1	SR
Daucus carota L.	Umbelliferae	ABCFG	5	H
Dianthus armeria L.	Caryophyllaceae	C	3	H
Epilobium hirsutum L.	Onagraceae	DEF	1	H
Epilobium tetragonum L.	Onagraceae	BCF	1	H
Epipactis helleborine Crantz	Orchideaceae	B	r	H
Euonymus europaeus L.	Celestraceae	ABCEFG	3	SR
Eupatorium cannabinum L.	Compositae	AF	r	H
Festuca sp.	Graminaceae	ACFG	1	H
Fragaria vesca L.	Rosaceae	ABCFG	1	H
Fraxinus ornus L.	Oleaceae	ABCEFG	5	STR
Galium sp.	Rubiaceae	ABCDE	5	H
Galium album Miller	Rubiaceae	C	3	H
Galium aparine L.	Rubiaceae	ABDE	5	H
Galium rotundifolium L.	Rubiaceae	BE	5	H
Galium verum L.	Rubiaceae	A	5	H
Geranium molle L.	Geraniaceae	F	r	H
Geranium nodosum L.	Geraniaceae	AF	3	H
Geranium pusillum L.	Geraniaceae	BE	1	H
Geranium robertianum L.	Geraniaceae	ABCEFG	7	H
Geranium sylvaticum L.	Geraniaceae	AE	1	H
Geum urbanum L.	Rosaceae	ABCEFG	3	H
Hedera helix L.	Araliaceae	ABCDEFG	9	V
Helleborus foetidus L.	Ranunculaceae	E	r	H
Helleborus odorus Waldst. et Kit.	Ranunculaceae	B	r	H
Hemerocallis fulva L.	Liliaceae	A	7	H
Hepatica nobilis Miller	Ranunculaceae	AB	3	H
Holcus lanatus L.	Graminaceae	BCEG	5	H
Hordeum vulgare L.	Graminaceae	C	1	H
Hypericum sp.	Guttiferae	C	r	H
Hypericum perforatum L.	Guttiferae	CG	1	H
Iberis semperflorens L.	Cruciferae	A	1	H
Ilex aquifolium L.	Aquifoliaceae	ABF	1	STR
Iris pseudacorus L.	Iridaceae	E	1	H
Juglans regia L.	Juglandaceae	B	r	R
Juncus articulatus L.	Juncaceae	F	1	H
Juncus effusus L.	Juncaceae	EF	7	H
Knautia arvensis Coulter	Dipsacaceae	C	r	H
Laburnum anagyroides Medicus	Leguminosae	ABCEFG	9	STR
Lactuca serriola L.	Compositae	F	r	H
Lamium maculatum L.	Labiatae	A	1	H
Lamium purpureum L.	Labiatae	BCE	i	H
Lapsana communis L.	Compositae	F	r	H
Lathyrus sp.	Leguminosae	ABCF	1	H
Lathyrus venetus Wohlff.	Leguminosae	AB	1	H
Lathyrus vernus Bernh.	Leguminosae	AB	3	H
Laurus nobilis L.	Lauraceae	ABCEFG	9	STR
Leontodon sp.	Compositae	CF	r	H
Ligustrum vulgare L.	Oleaceae	ABCEF	7	SR
Leucanthemum vulgare Lam.	Compositae	CG	3	H
Lolium perenne L.	Graminaceae	C	5	H
Lonicera caprifolium L.	Caprifoliaceae	ABCEF	3	V
Lotus corniculatus L.	Leguminosae	ACG	5	H
Luzula sp.	Juncaceae	ABCEFG	5	H

<i>Lychnis flosculi</i> L.	Caryophyllaceae	CG	1	H
<i>Medicago lupulina</i> L.	Leguminosae	CG	3	H
<i>Melica uniflora</i> Retz.	Graminaceae	ABEF	5	H
<i>Melissa officinalis</i> L.	Labiatae	EFG	1	H
<i>Mymicelis muralis</i> Dumort.	Compositae	AF	r	H
<i>Myosotis arvensis</i> Hill	Boraginaceae	A	1	H
<i>Nelumbo nucifera</i> Gaertner	Nymphaeaceae	DE	9	H
<i>Nymphaea alba</i> L.	Nymphaeaceae	DEF	9	H
<i>Odontites rubra</i> Opiz	Scrophulariaceae	CE	1	H
<i>Ornithogalum umbellatum</i> L.	Liliaceae	A	1	H
<i>Orobancha</i> sp.	Orobanchaceae	B	r	H
<i>Ostrya carpinifolia</i> Scop.	Corylaceae	ABE	1	STR
<i>Parietaria diffusa</i> M. et K.	Urticaceae	ABEF	7	H
<i>Pedicularis sylvatica</i> L.	Scrophulariaceae	F	r	H
<i>Phragmites australis</i> Trin.	Graminaceae	E	1	H
<i>Phillyrea latifolia</i> L.	Oleaceae	BF	1	STR
<i>Picris echioides</i> L.	Compositae	C	1	H
<i>Plantago lanceolata</i> L.	Plantaginaceae	ABC	3	H
<i>Plantago major</i> L.	Plantaginaceae	C	1	H
<i>Plantago media</i> L.	Plantaginaceae	ACEFG	3	H
<i>Platanus hybrida</i> Brot.	Platanaceae	E	r	R
<i>Poa</i> sp.	Graminaceae	ABCFG	5	H
<i>Poa annua</i> L.	Graminaceae	ACF	5	H
<i>Poa bulbosa</i> L.	Graminaceae	BCFG	1	H
<i>Poa pratensis</i> L.	Graminaceae	ABC	5	H
<i>Polypodium vulgare</i> L.	Polypodiaceae	ABF	1	H
<i>Populus nigra</i> L.	Salicaceae	E	r	T
<i>Potentilla</i> sp.	Rosaceae	CF	1	H
<i>Primula vulgaris</i> Hudson	Primulaceae	ABCEFG	3	H
<i>Prunus avium</i> L.	Rosaceae	BEF	r	R
<i>Prunus cerasifera</i> Ehrh.	Rosaceae	B	r	R
<i>Prunus laurocerasus</i> L.	Rosaceae	ABF	9	STR
<i>Prunus spinosa</i> L.	Rosaceae	ABCEF	7	SR
<i>Pulicaria dysenterica</i> Bernh.	Compositae	ACEF	5	H
<i>Pulmonaria officinalis</i> L.	Boraginaceae	ACFG	1	E
<i>Quercus cerris</i> L.	Fagaceae	ABCFG	3	STR
<i>Quercus ilex</i> L.	Fagaceae	ABCEFG	7	STR
<i>Quercus pubescens</i> Willd.	Fagaceae	ABC	1	STR
<i>Quercus robur</i> L.	Fagaceae	ABCEFG	5	STR
<i>Ranunculus</i> sp.	Ranunculaceae	BC	5	H
<i>Ranunculus velutinus</i> Ten.	Ranunculaceae	ABCEFG	7	H
<i>Rapistrum perenne</i> All.	Cruciferae	CFG	1	H
<i>Rhus toxicodendron</i> L.	Anacardiaceae	A	1	S
<i>Ribes rubrum</i> L.	Saxifragaceae	A	r	S
<i>Robinia pseudoacacia</i> L.	Leguminosae	ABEF	3	STR
<i>Rosa</i> sp.	Rosaceae	ABCF	1	SR
<i>Rubia peregrina</i> L.	Rubiaceae	ABCDEF	9	V
<i>Rubus</i> sp.	Rosaceae	ABCDEF	9	SR
<i>Rubus caesius</i> L.	Rosaceae	ABCEF	9	SR
<i>Rubus ulmifolius</i> Schott	Rosaceae	ABCEF	9	SR
<i>Rumex</i> sp.	Polygonaceae	CF	1	H
<i>Rumex acetosa</i> L.	Polygonaceae	B	r	H
<i>Ruscus aculeatus</i> L.	Liliaceae	ABCEF	9	H
<i>Salix alba</i> L.	Salicaceae	DEF	1	ST

<i>Salix caprea</i> L.	Salicaceae	EF	r	ST
<i>Sambucus nigra</i> L.	Caprifoliaceae	ABF	1	SR
<i>Sanguisorba minor</i> Scop.	Rosaceae	AC	3	H
<i>Sedum acre</i> L.	Crassulaceae	E	1	H
<i>Sedum dasycyllum</i> L.	Crassulaceae	AE	1	H
<i>Sedum rupestre</i> L.	Crassulaceae	DE	1	H
<i>Senecio</i> sp.	Compositae	BC	3	H
<i>Senecio erucifolius</i> L.	Compositae	C	1	H
<i>Senecio vulgaris</i> L.	Compositae	C	3	H
<i>Silene vulgaris</i> Garcke	Caryophyllaceae	ABCF	1	H
<i>Sison amomum</i> L.	Umbelliferae	BCEF	3	H
<i>Solanum dulcamara</i> L.	Solanaceae	ABDEF	5	H
<i>Solanum nigrum</i> L.	Solanaceae	F	3	H
<i>Sonchus oleraceus</i> L.	Compositae	CF	1	H
<i>Sorbus domestica</i> L.	Rosaceae	BG	r	R
<i>Sorbus torminalis</i> Crantz	Rosaceae	ABF	1	STR
<i>Spiraea</i> sp.	Rosaceae	B	r	S
<i>Stachys officinalis</i> Trevisan	Labiatae	ACG	3	H
<i>Stellaria media</i> Vill.	Caryophyllaceae	CF	1	H
<i>Tamus communis</i> L.	Dioscoreaceae	ABE	3	H
<i>Taxus baccata</i> L.	Taxaceae	B	r	R
<i>Taraxacum officinale</i> Weber	Compositae	A	r	H
<i>Teucrium scorodonia</i> L.	Labiatae	CG	r	H
<i>Thymus pulegioides</i> L.	Labiatae	A	1	H
<i>Tilia cordata</i> Miller	Tiliaceae	BE	r	SR
<i>Torilis arvensis</i> Link	Umbelliferae	AB	r	H
<i>Trifolium</i> sp.	Leguminosae	AC	3	H
<i>Trifolium pratense</i> L.	Leguminosae	ACFG	5	H
<i>Trifolium repens</i> L.	Leguminosae	ACFG	5	H
<i>Typha latifolia</i> L.	Sparganiaceae	DEF	9	H
<i>Ulmus canescens</i> Melville	Ulmaceae	A	r	S
<i>Ulmus minor</i> Miller	Ulmaceae	ABCEFG	9	STR
<i>Urtica dioica</i> L.	Urticaceae	EF	1	H
<i>Verbascum</i> sp.	Scrophulariaceae	BF	r	H
<i>Verbascum nigrum</i> L.	Scrophulariaceae	C	r	H
<i>Verbascum thapsus</i> L.	Scrophulariaceae	ACE	1	H
<i>Verbena officinalis</i> L.	Verbenaceae	ACE	3	H
<i>Veronica</i> sp.	Scrophulariaceae	BCFG	1	H
<i>Veronica agrestis</i> L.	Scrophulariaceae	F	r	H
<i>Viburnum tinus</i> L.	Caprifoliaceae	ABCEFG	9	STR
<i>Vicia cracca</i> L.	Leguminosae	AG	1	H
<i>Vicia sativa</i> L.	Leguminosae	A	1	H
<i>Vinca minor</i> L.	Apocynaceae	ABCDEFG	9	H
<i>Viola</i> sp.	Violaceae	ABCEFG	3	H
<i>Viola alba</i> Besser	sp. delinhardtii W. Becker Violaceae	A	1	H
<i>Viola hirta</i> L.	Violaceae	ABCG	3	H
<i>Vincetoxicum hirundinaria</i> Medicus	Asclepiadaceae	A	r	H
<i>Vulpia</i> sp.	Graminaceae	C	r	H

Explanation of symbols: distribution into areas: A = Appennino area; B = Wood near the Farm; C = Meadow near the Farm; D = Buontalenti Pond; E = Frietsch Pond; F = Wood near the Villa; G = meadow near the Chapel. FREQUENCY OF TAXA: r = rare; 1 = less than 1%; 3 = relatively frequent; 5 = frequent; 7 = very frequent; 9 = abundant. HABITUS: H = Herb; T = Tree; R = Regeneration (seedling and sucker); V = climbing Vine; S = Shrub.

The floristic inventory has enabled us to identify 205 taxonomic entities ; for 179 of these we were able to identify also the species or subspecies. The taxa belong to 153 genera falling into 62 families (table 2). The enumeration of individuals belonging to woody species totalled 7291 (including seedlings and young suckers).

Given the fairly small surface area under study, the number of different taxa detected is very high. There are many reasons for this, but the most important ones are the following :

- the survey was based on the findings of a complete analysis, and not on sampling;
- none of the areas is homogeneous and the environmental factors (water, substrate, light and anthropogen pressure) play a fundamental role in influencing plant populations, so that there many different biological forms present.

For example, among the plants in the pools we found rooting hydrophytes (*Nelumbo nucifera* and *Nymphaea alba*), helophytes (*Carex pendula*, *Juncus effusus*, *Phragmites australis*) and hygrophytes (*Salix alba* and *S. caprea*), as well as xerophytes such as *Ceterach officinarum* and several types of *Sedum* growing along the stone borders.

RESULTS

The Pond

As has already been pointed out, the large pond (2600 square metres) in front of the Appennino can be divided into two sections very different in character and origin. Note that, after our survey was concluded, the pools underwent a restoration which has totally modified the floristic composition.

1. « Buontalenti Pond ». At the time of our survey the surface of the pool was literally covered with *Typha latifolia*, *Nelumbo nucifera* and *Nymphaea alba* (Fig. 5) ; only a very small portion of the pool remained free because the depth of the water. It is a very homogeneous environment, not very rich in taxa : it contains only 6.9 % of all taxa detected.
2. « Frietsch Pond ». Most of this pond was silted up and only flooded periodically : as a result, on the part that was constantly under water we found only hydrophytes, whereas in the other areas we found species with reduced water needs, including many trees (willows, elms and poplars). The microenvironmental differentiation and the long period of abandonment had favoured the development of a varied flora, but one

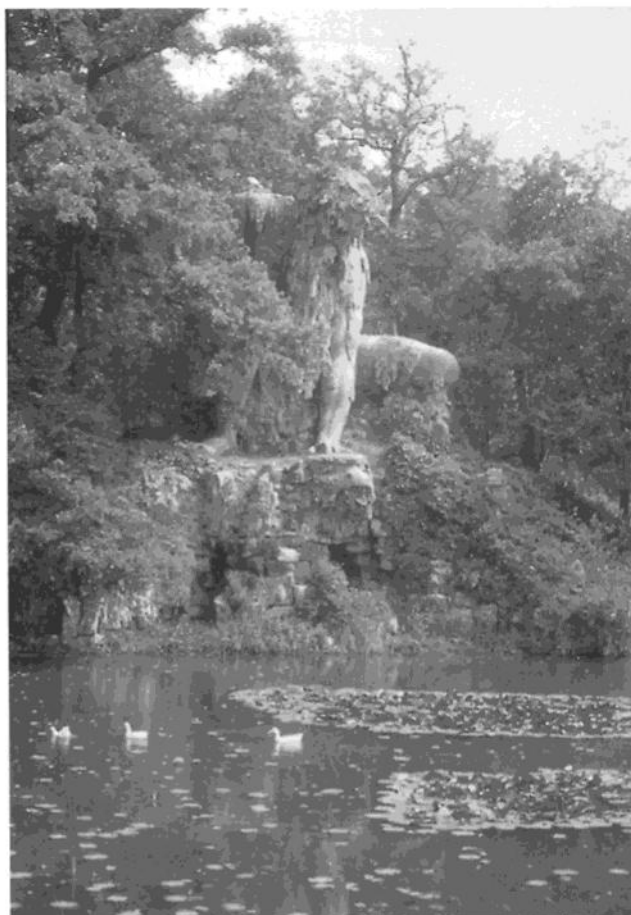


Fig. 5. The pond in spring.

that had spread in a random way, although some species were clearly of anthropogen origin and are interesting from an ornamental point of view (*Nelumbo nucifera* and *Nymphaea alba*). There are 77 taxa present in this section, 37.6 % of all taxa inventoried.

The Appennino Area

In this area (350 square metres) the presence and distribution of plants is basically random; the herbaceous species are most numerous, while the woody species are present in shrub form. There are, however, certain species present, such as *Rhus toxicodendron*, *Hemerocallis fulva* and *Iberis semperflorens*, which were clearly from planted, and specifically the projects promoted by the Demidoff family to enhance the ornamental nature of the gardens. On the side overlooking the pool, the plinth of the statue is covered by a thick infesting vegetation (*Rubus sp.*, *Ulmus carpinifolia*, *Solanum dulcamara*,



Fig. 6. Distribution of shrubs and vines on the sculptural complex of the Appennino (front). Shrubs: (1) *Celtis australis*, (2) *Cornus sanguinea*, (3) *Fraxinus ornus*, (4) *Laburnum anagyroides*, (5) *Quercus ilex*, (6) *Rhus toxicodendron*, (7) *Rubus caesius*, (8) *R. ulmifolius*, (9) *Sambucus nigra*, (10) *Ulmus canescens*, (11) *Ulmus minor*, (12) *Viburnum tinus*; vines: (13) *Clematis vitalba*, (14) *Hedera helix*, (15) *Lonicera caprifolium*, (16) *Rubia peregrina*.

Carex pendula, *Parietaria diffusa*, *Hedera helix*, *Rubia peregrina*, *Cornus sanguinea*, *Quercus ilex*, etc.). The statue itself has clusters of grasses and other herbaceous plants growing on it, as well as shrub-like forms (table 3 and fig. 6).

One can say, therefore, that the statue of the Appennino is a polyspecific area: the survey detected 117 taxa, of which 71 % are herbaceous species. With the exception of a few areas where we can still see evidence of previous interventions by man, most of these plants are of no interest, neither botanically nor historically. Indeed, on the actual statue itself they present a considerable risk for its stability (see also Caneva and Tiano, 1988). During the restoration operations these plants were eliminated.

« Wood near the Villa ». This area is a strip of land between the ponds and the tree-lined pathways (470 square metres). In this wood, for the most part made up of deciduous trees (62.5 %), the arboreal component is not very dense, and the tree cover is estimated at 45 %; whereas the shrub component has a cover density of 61 %. The most interesting structure is a series of trees (oaks) arranged in a straight row. The importance of this row is due to the fact that on the opposite side of the Appennino (see below, next paragraph on the « Wood near the Farm ») there were two other rows of trees which, all together, made up a sort of green backdrop enclosing the statue. All that remains of this theatrical backdrop is now a common oak and a holm oak; at different times six other trees were uprooted (common and holm oaks). The empty spaces have been

TABLE 3. — PLANT INVENTORY OF THE SCULPTURAL COMPLEX OF APPENNINO

APTERIDOPHYTA		OLEACEAE	
ASPLENIACEAE		Fraxinus ornus L.	S
Asplenium trichomanes L.	H	APOCYNACEAE	
Ceterach officinarum DC.	H	Vinca minor L.	H
ANGIOSPERMAE		RUBIACEAE	
CORYLACEAE		Galium aparine L.	H
Ostrya carpinifolia Scop.	S	Rubia peregrina L.	C
FAGACEAE		BORAGINACEAE	
Quercus ilex L.	S	Buglossoides purpureocacrulea	
ULMACEAE		I. M. Johnston	H
Celtis australis L.	S	VERBENACEAE	
Ulmus canescens Melville	S	Verbena officinalis L.	H
Ulmus minor Miller	S	LABIATAE	
URTICACEAE		Ajuga reptans L.	H
Parietaria diffusa M. et K.	H	Lamium maculatum L.	H
RANUNCOLACEAE		SOLANACEAE	
Clematis vitalba L.	C	Solanum dulcamara L.	H
Ranunculus velutinus Ten.	C	SCROPHULARIACEAE	
LAURACEAE		Cymbalaria muralis	
Laurus nobilis L.	S	Gaertn., Mey. et Sch.	H
CRUCIFERAE		Verbascum thapsus L.	H
Cardamine pratensis L.	H	Veronica sp.	H
CRASSULACEAE		CAPRIFOLIACEAE	
Sedum dasyphyllum L.	H	Lonicera caprifolium L.	C
ROSACEAE		Sambucus nigra L.	S
Fragaria vesca L.	H	Viburnum tinus L.	S
Rubus sp.	H	CAMPANULACEAE	
Rubus caesius L.	H	Campanula sp.	H
Rubus ulmifolius Schott.	H	COMPOSITAE	
Sorbus torminalis Crants	H	Bellis perennis L.	H
LEGUMINOSAE		Crepis sp.	H
Laburnum anagyroides Medicus	S	Eupatorium cannabinum L.	H
GERANIACEAE		Mycelis muralis Dumort	H
Geranium robertianum L.	H	Sonchus oleraceus L.	H
Geranium sylvaticum L.	H	LILIACEAE	
ANACARDIACEAE		Allium vineale L.	H
Rhus toxicodendron L.	S	Ornithogalum umbellatum L.	H
VIOLACEAE		IRIDACEAE	
Viola sp.	H	Iris pseudacorus L.	H
Viola alba Besser subsp. dehn-	H	GRAMINACEAE	
hardtii Becker		Agrostis stolonifera L.	H
Viola hirta L.	H	Brachipodium pinnatum Beauv.	H
CORNACEAE		Bromus sterilis L.	H
Cornus sanguinea L.	S	Cynodon dactylon Pers.	H
ARALIACEAE		Dactylis glomerata L.	H
Hedera helix L.	C	Lolium perenne L.	H
UMBELLIFERAE		Melica uniflora Retz.	H
Anthriscus sp.	H	Poa sp.	H
Daucus carota L.	H	ARACEAE	
PRIMULACEAE		Arisarum vulgare Targ. Tozz.	H
Cyclamen hederifolium Ait.	H	Arum italicum Miller	H
Primula vulgaris Hudson	H	CYPERACEAE	
		Carex pendula Hudson	H

Abbreviations: c: climbing vines; H: Herb.; S: Seedling or Shrub.

taken over by other trees, mainly deciduous trees, such as *Robinia pseudo-acacia*, *Sorbus torminalis*, *Acer campestre* and *Ulmus carpiniifolia*, as well as a thick infesting vegetation.

1. « Wood near the Farm ». This is undoubtedly the most interesting area, which has been affected greatly by all the different remodelling projects. This area (1200 square metres) can be defined as a forest stand with individuals of different ages, where the dominant plane is made up of deciduous oaks, while the dominated plane also presents evergreens; despite the high incidence of infesting plants, the shrubs that make up the understorey are for the most part evergreen broadleaves and account for 61.7 % of individuals. The herbaceous layer is greatly conditioned by the high degree of arboreal cover (70 %) (Fig. 3); and, although the herbaceous species present account for 57.8 % of taxa detected, there are only really a few of importance: *Vinca minor*, *Geranium robertianum*, *Cyclamen hederifolium*, *Hedera helix* and *Rubia peregrina*. While the shrubs are distributed uniformly, the herbaceous cover appears to be entirely complementary to the arboreal layer.

Today, the distribution of the trees and shrubs in this area is the result of cultivation practices, which favoured the development of an evergreen understorey, on the one hand, and of accidental events and management decisions to create clearings or openings between the tree crowns, on the other. These elements, together with the period of total abandonment during the 1960s and 1970s, have caused the three components to undergo parallel evolutionary patterns.

The charts indicating the correlations and the spatial layout report the position of the plants (e.g., see figure 7); this enables us to highlight some special features of the botanical evolution in this area.

The most interesting aspect, which we detected thanks to our analysis, is a series of alignments parallel to the statue of the Appennino: they consist in five rows, two rows of trees and three of shrubs which created the following formations:

1. what was probably a pathway;
2. two rows of trees:
3. one element of the tripartite pathway formation.

The pathway (1) presumably ran around the Appennino and was lined with box hedges and spiraeas (some examples have survived). Archaeological investigations have revealed the remains of a wall which, at least for part of the way, ran parallel to the box hedge (Vannini, 1988). Near the Villa there are still short stretches of box hedge of the same age as this one.

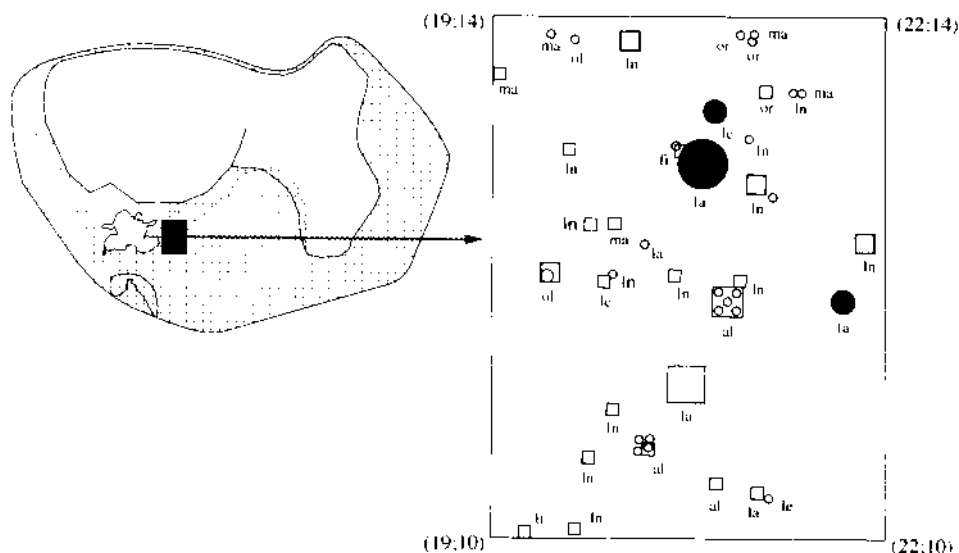


Fig. 7. Detail of the charts of spatial layout of trees and shrubs. White circle : living coppices of different diameter, dead coppices of different diameter, black circle : trees of different diameter (d.b.h.), square : living suckers areas of different surface. Species symbols : al Laurus nobilis, fa Quercus robur, fi Phillyrea latifolia, la Prunus laurocerasus, le Quercus ilex, ln Viburnum tinus, li Ligustrum vulgare, ma Laburnum anagyroides, ol Ulmus minor, or Fraxinus ornus. (The detailed surface is twelve 2 × 2 m grids).

According to the layout of the trees and shrubs, this pathway must have taken a sharp right turn when it reached the edge of the pool, then continuing along the current edge of the flat area, all the way to the « promontory » covered with holm oaks. There is another element which suggests this, apart from the distribution of the trees : the presence of a *Phillyrea* tree, a plant which can be of considerable semantic importance since it was commonly used for polyspecific hedges.

The two rows of trees (2) are made up of three large common oaks placed at about ten metres from the Appennino and a second series of trees, a bit further away (about 30 m), consisting of a Turkey oak, a common oak and a few holm oaks. There are also some old dead coppices which suggest that the rows were originally much longer. These are all fairly largesized trees, dating from the renovation carried out under the direction of Frietsch. The alignment is not haphazard : in other words it is not the result of competition among the crowns, since the distances within each row are smaller than those between the different rows.

These two rows of trees, together with the one on the other side of the statue, created a sort of theatrical backdrop for the space behind the Appennino.

Along the outer edge of the second row, and parallel to it, there is a strip of land nowadays covered with shrubs and young trees which have grown up spontaneously. In Frietsch's map (Plan des k.k. grossherzoglichen Parkes zu Pratolino, see Zangheri, 1979) the vegetation in this area is much sparser; at present the strip of spontaneous shrubs and the area depicted by Frietsch are almost identical. Furthermore, from a comparison with earlier maps depicting the formal garden, it would appear to be the left axis of the tripartite pathway system, the tree-lined avenues which ran from the Appennino monument to the large « sponge » to the left of the statue of Zeus.

2. « Wood near the Chapel ». This is an area with a uniform morphology: almost flat (600 square metres), it is a stand of deciduous trees (mostly oaks, but also the occasional linden and plane tree). It is very similar to the « Wood near the Farm » but the vegetation is much denser. This part of the Appennino area underwent a great number of changes when the estate belonged to the Demidoff family: for example, the outer edge was cut back and bordered by the tree-lined avenue we see today, whereas on the side nearest the pool we can still see the remains of the little jetty (Pozzana, 1986). Because of the interventions and the lack of emergencies of any particular importance we are not in a position to reconstruct the earlier vegetation.
3. « Meadow near the Farm ». Despite the small size of this area (250 square metres) it is the one with most species (57.9 % of all taxa identified). The species of trees and shrubs are present here as seedlings; since the grass in the meadow is regularly cut, only along the edges of the woodlands can we find several young coppices.
4. « Meadow near the Chapel ». This is a very small area (50 square metres), on a steeply sloping ground, where the survey identified 62 taxa, about three quarters of which are herbaceous. Here, too, the woody species are present only as seedlings. Both meadows are fairly recent in origin.

Regeneration

The areas present a good regeneration rate and the remarkable degree of species richness among the taxa is obviously reflected in the presence of young individuals from a wide number of species: in the « Wood near the Farm » alone we listed seedlings and/or suckers of 31 taxa (considering *Crataegus monogyna* and *C. oxyacantha* separately).

Although the majority of species present are shrubs, there is also a good representation of trees, such as deciduous oaks and holm oaks, *Acer*

TABLE 4. — REGENERATION RATE OF SEEDLINGS AND/OR SUCKERS PRESENT IN THE WOODS NEAR THE VILLA AND THE FARM AND IN BOTH THE MEADOWS

The Villa	Wood Near the Farm	Wood Near	Meadows
<i>Acer campestre</i>	17.19	6.51	12.95
<i>Acer pseudoplatanus</i>	1.07		
<i>Buxus sempervirens</i>		0.43	
<i>Cornus sanguinea</i>	21.48	49.24	253.98
<i>Crataegus sp.</i>	17.19	39.91	77.69
<i>Daphne laureola</i>		3.04	1.99
<i>Euonymus europaeus</i>	39.74	22.99	39.74
<i>Fraxinus ornus</i>	65.74	22.99	
<i>Ilex aquifolium</i>	20.41	2.39	
<i>Juglans regia</i>		0.22	
<i>Laburnum anagyroides</i>	71.97	66.81	35.00
<i>Laurus nobilis</i>	307.20	170.07	24.90
<i>Ligustrum vulgare</i>	31.48	96.75	173.31
<i>Lonicera caprifolium</i>	1.07	1.74	
<i>Ostrya carpinifolia</i>		1.08	
<i>Phillyrea latifolia</i>	1.07	0.22	
<i>Prunus avium</i>	2.15	0.87	
<i>Prunus cerasifera</i>		1.08	
<i>Prunus laurocerasus</i>	15.04	5.21	
<i>Prunus spinosa</i>	6.44	34.92	193.23
<i>Quercus cerris</i>	23.63	33.62	12.95
<i>Quercus ilex</i>	67.67	55.75	4.98
<i>Quercus pubescens</i>			1.00
<i>Quercus robur</i>	20.41	13.01	9.96
<i>Robinia pseudoacacia</i>	2.15	8.03	1.00
<i>Rosa sp.</i>	1.07	5.42	5.98
<i>Sambucus nigra</i>	8.59	0.43	
<i>Sorbus domestica</i>		0.22	1.00
<i>Sorbus torminalis</i>	2.15	4.34	
<i>Taxus baccata</i>		0.22	
<i>Ulmus minor</i>	143.93	77.01	34.86
<i>Viburnum tinus</i>	186.90	257.70	45.85

Regeneration rate : $IR = \frac{n}{N} \cdot 1000$ (for explanations see the text)

where :

n = number of stems of a species (seedlings and/or suckers)

N = total number of stems per species

campestre, *Fraxinus ornus*, *Sorbus torminalis* and *Ulmus carpinifolia* (Table 4). If correctly managed, the vegetation, including the trees, can clearly renew itself satisfactorily, thereby producing an arboreal cover of considerable aesthetic and ornamental value.

CONCLUSIONS

The history of the gardens at Pratolino echoes the history of the European garden, from the rediscovery of Man in the Renaissance to the Romantic return to Nature.

The restoration of this park today cannot possibly aim at recreating the formal model: this would be an artefact that would destroy the garden, and bring it far away from Buontalenti's garden except the model. Nonetheless, a restoration is necessary to halt the degeneration: for example, the increasing dominance of *Robinia* and the expansion of fast-growing conifers (see Ferrara and Campioni, 1985; Gellini and Grossoni, 1985 and 1988).

The purpose of the iconological studies performed as part of this survey was to learn about the past in order to understand the current situation better; thanks to these studies we were able to reconstruct the various stages and understand the role and importance of the different components of the gardens.

The main purpose of this paper is to illustrate the methodologies followed in the research project.

In the specific case of the Appennino monument, the results obtained have allowed us to determine some species which were certainly introduced by man, and others which, although spontaneous, were favoured for purely aesthetic reasons.

An examination of the spatial distribution of the trees and shrubs enabled us to identify some structures dating back to Joseph Frietsch's project, and others which may even be remnants of the original Mannerist formal garden.

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