



Partner 12

Treebreedex Seminar

"What

do large genetic field experimental networks across Europe bring
to the scientific community?"

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Sękocin Stary, Warsaw, POLAND



International trials concerning forest species in Italy

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CRA SEL

Italy and specially CRA SEL always had shared efforts for establishing international experiments on forest species.

- Only large experiments can allow the understanding of **productive potential** and **adaptation traits** of species.
- This concept was clear and shared through all Europe since the early last century.
- Most of international tests were initially focused on conifers, mostly exotics but also hardwood species...

Pseudotsuga menziesii

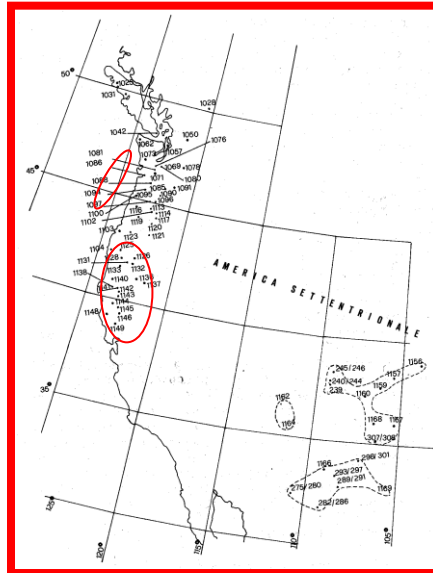
introduced in Italy since 1882, in Tuscany (Chianti area), while the first introduction tests were established in 1887, in Tuscany (in Vallombrosa, near Florence).

annual yield ranging between 13.5 and 16.4 m³/ha/year. In Tuscan Apennines standing volumes range between 500 and 820 m³/ha at age 50.

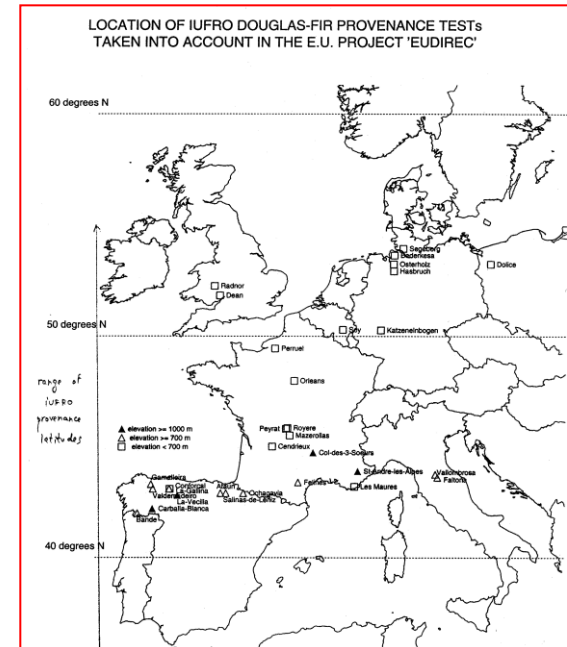
- Iufro 1953 - 11 provenances (Or, Wa)
- IUFRO 1957 - 4 provenances (Wa)
- Iufro 1969/1970 - 85 provenances, 21 of them from interior + 10 Italian
- Eudirec Burnt Wood prov. progenies + 10 Italian

Main Results:

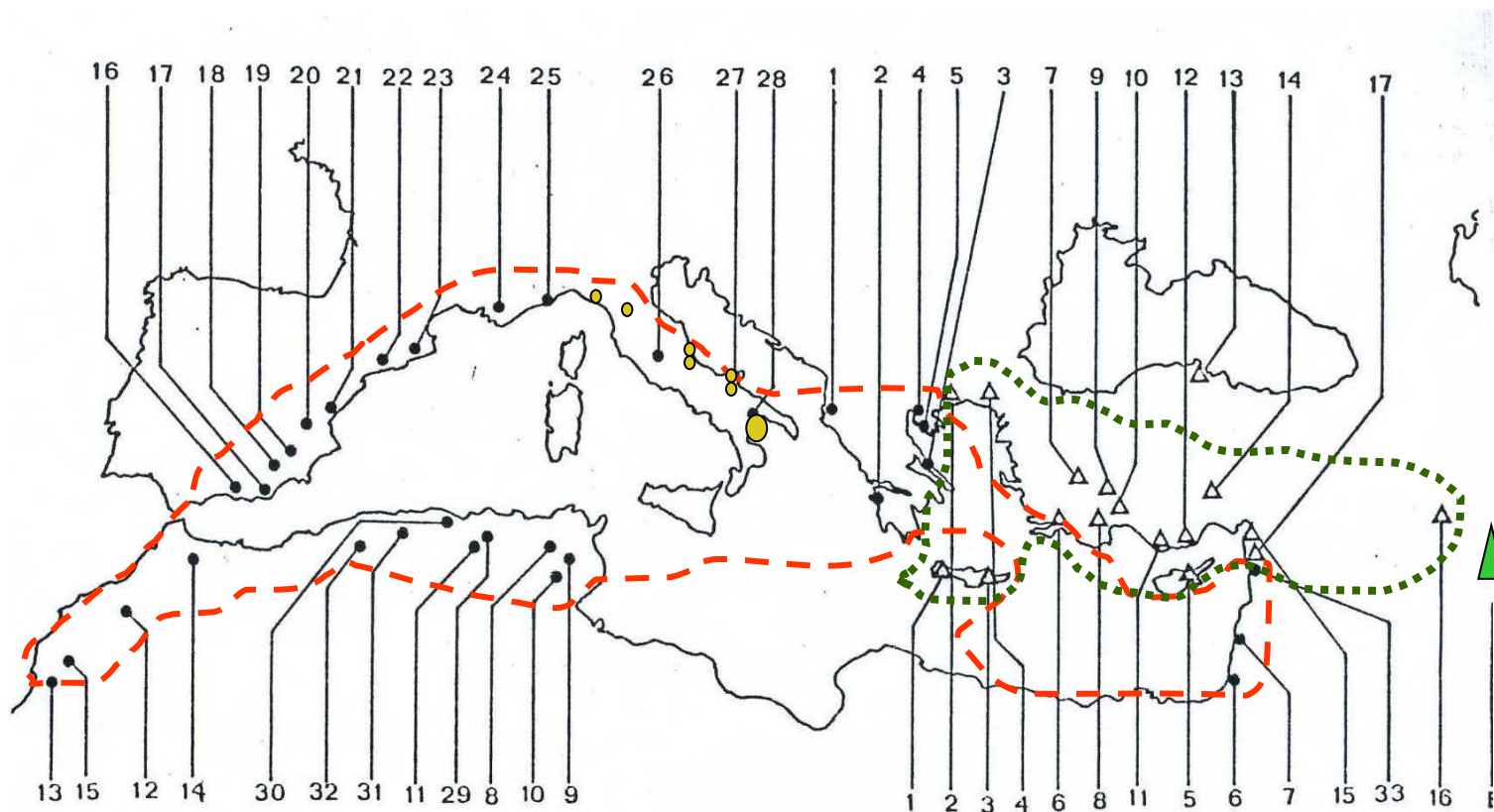
- Best origins and best artificial seed stands;
- Phenotypic traits
- phenology;
- adaptation (survival)



Aerial view of Faltona field trials. The photo shows the differences in adaptation to environmental conditions of site of the IUFRO provenances used in this test.



The international network of FAO/4bis (Coord. Ex ISSEL)
 on *Pinus halepensis* Section Species/Provenances shared by 8 Medit. partners



Posizione geografica delle provenienze

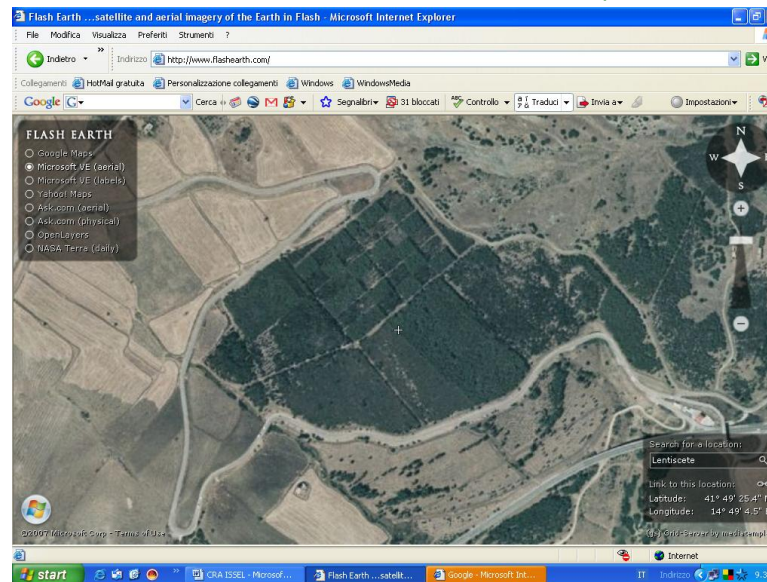
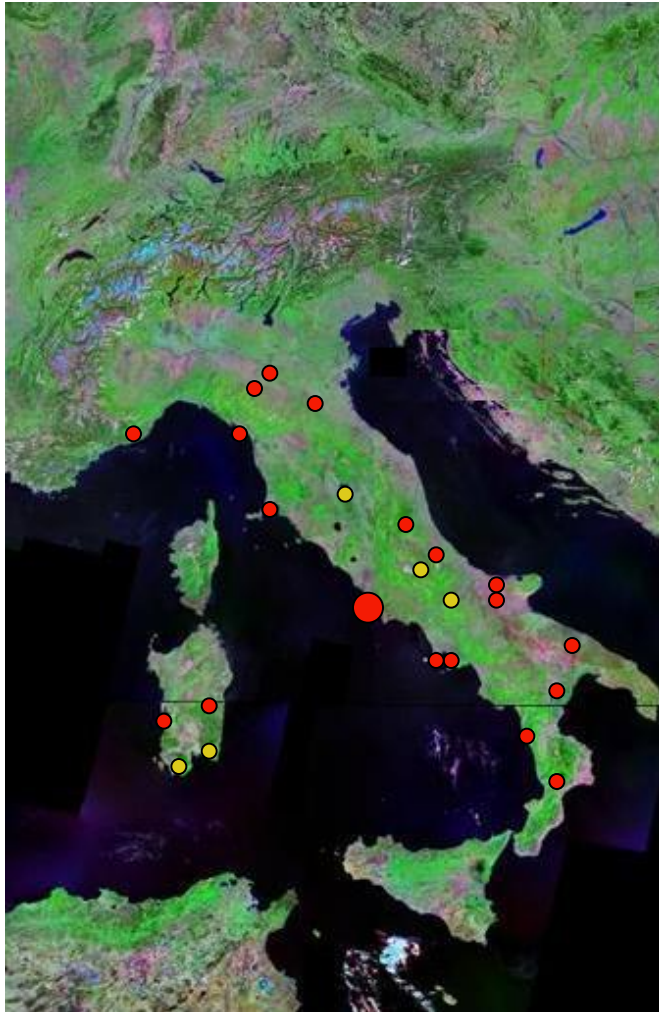
- *Pinus halepensis* ● *P. h.* Seed Stands
- △ *Pinus brutia*
- ▲ *Pinus eldarica*

Mediterranean Pines (Haleppo pines section - International trilas in Italy

- Network CRA - PLF
- Network CRA - SEL

36 test still exist on 70 initially planted since 1975 in Italy, among about 300 tests were established in the framework of **FAO Silva mediterranea**.

Algeria, France, Greece, Israel, Italy, Morocco, Tunisia, Turkey

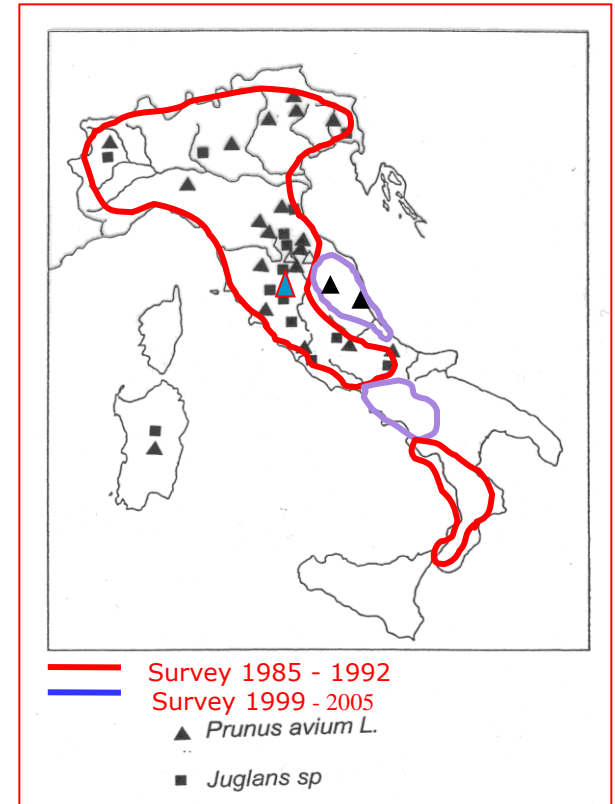


Lentiscete test site

southern Apennines CRA SEL

Prunus avium

- **1993, 29 Provenance/progenies from Caucasus** shared with INRA P1 (bilateral coll.) in 3 Italian sites (1 lost in 2008);
- **1993, 14 Italian clones + 11 French clones (AIR Always)** in 3 Italian sites;
- **2003, 11 full sib families FR x IT** shared with INRA P1 (bilateral coll.); only 1 Italian site.
- **2009, Seeds/seedlings exchanges** among EU countries (B. De Cuyper) for establishing trials.



Prunus avium

- The genetic variation of wild cherry trails was examined with several tools, in order to have a multivariate approach:
- Molecular markers SSRs (10 loci) on trees from 30 populations
- Biochemical markers (9 isoenzyme) on the same populations
- Leaf shape on a set from the same populations
- Flower phenology recorded for 3 years in 3 clonal archives, where the above 250 clones are hosted
- Selection of *Prunus avium* L. clones for resistance to *Phytophthora* sp. : early screening on micropropagated cherry clones, tested *in vitro* to avoid the *Phytophthora* spread in the environment, 2 wild cherry tissues, callus from leaf shoots and micropropagated plantlets were tested *in vitro*

Characterization of correlated proteins to pathogen resistance by Native Page electrophoresis



Prunus avium

Leaf shape

PCA

Provenance group

Early clones - 42°-45° latit.: BF, VG, VM, VTN, VTS, CT, AP, VLN

Late clones - 44°-46° latit.: AS, ML, PVS, TO, VC, VF

Factors: altitude and latitude

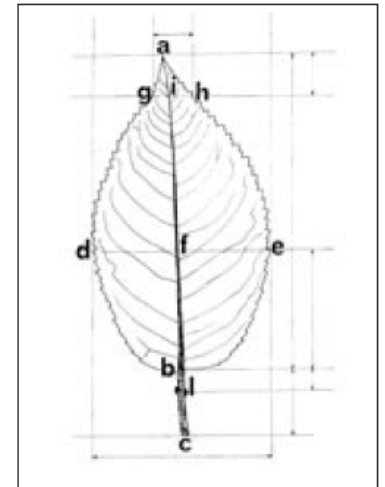
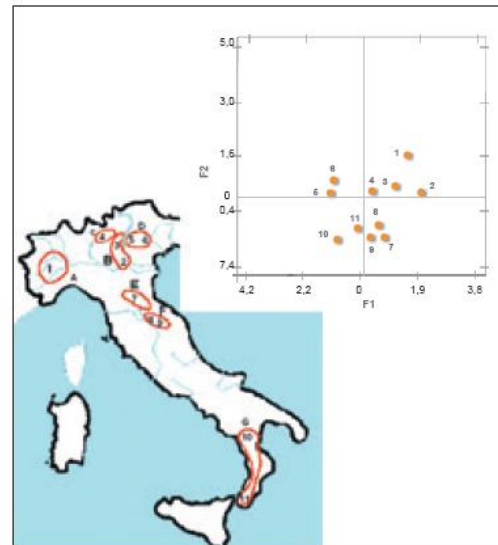
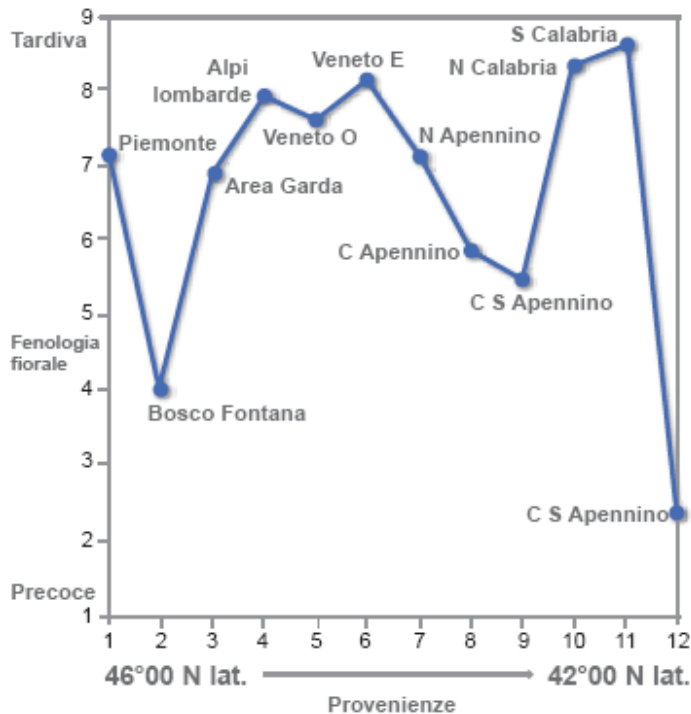
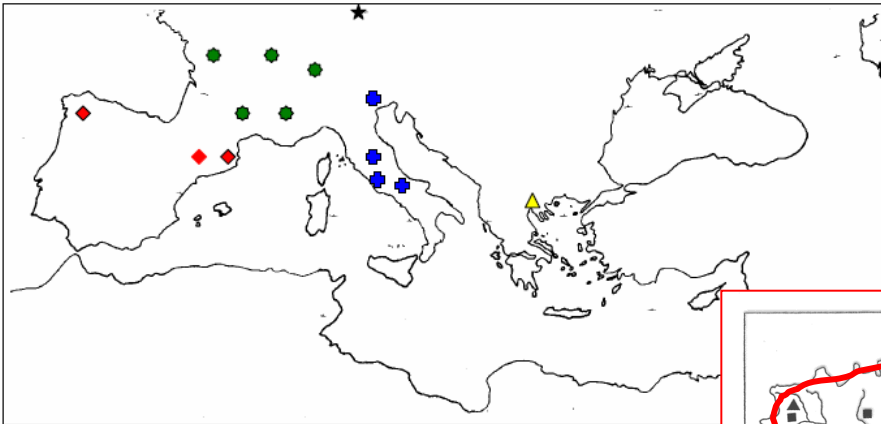


Figura 5 b - Parametri impiegati per la forma delle foglie (Ducchi *et al.* 1996).

Juglans sp.

Walnuts and Brains EU PRJs-International trails on EU walnuts materials.

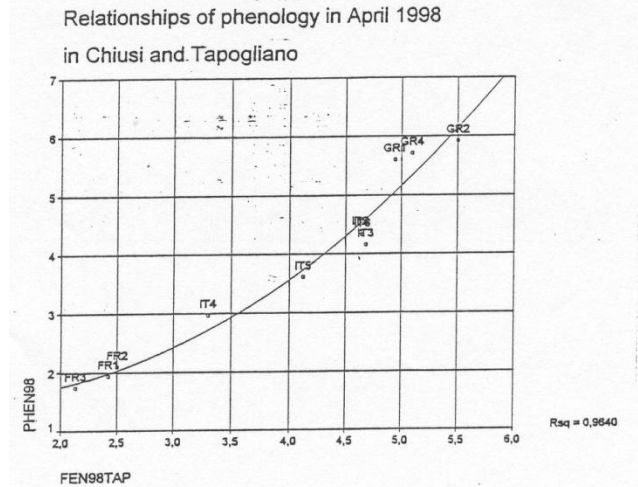
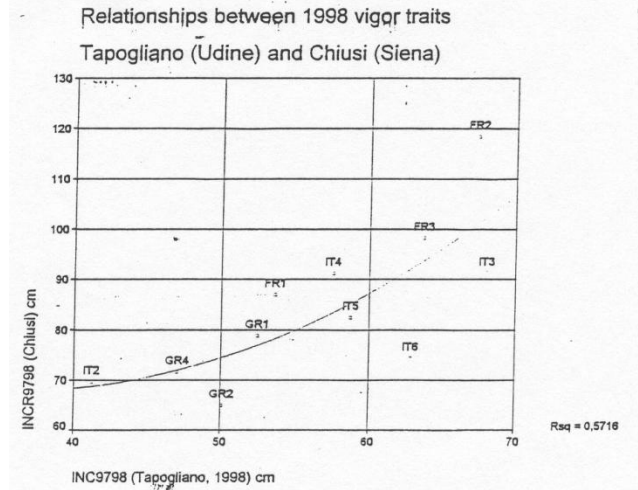
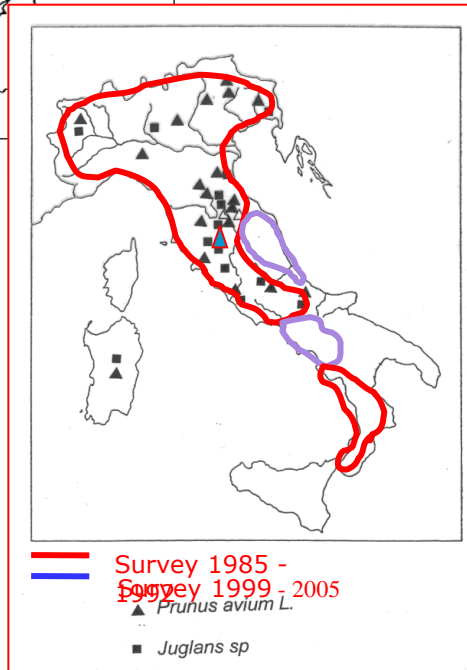
Figure 1 - The field test network established between 1995 and 1996 in the frame of Walnut Air Programme and continued during the Brains programme.



- Phenotypic traits;
- growth;
- tolerance/resistance to frosts;
- physiology of resistance to frosts.

Very good information for adaptation (phenology) and stem quality and architecture variability.

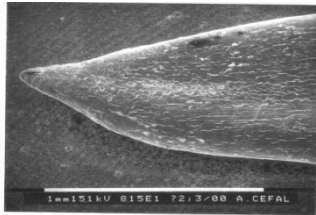
Database of tests does exist.



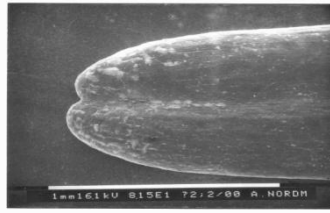
Stability of provenance phenology in two very different sites: northern Italy and South.

The Italian Greek fir and other Mediterranean firs

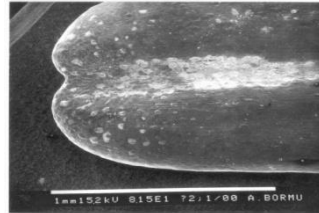
International field networks IUFRO



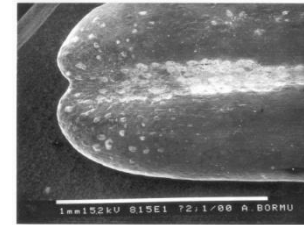
A. cephalonica



A. nordmanniana



A. bornmuelleriana



A. equi-trojani



Species

Provenances

A. bornmuelleriana

Cangal

Uludag

Kokez

Arag

A. nordmanniana

Karalindere

Ardanug

A. Equi-trojani

Kazdag

A. alba

Camaldoli,

Best provenances for growth:

Cangal and Arag for *A. bornmuelleriana*

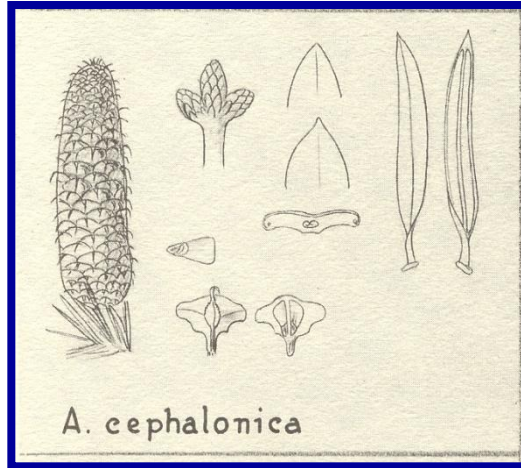
Kazdag - *A. equi-trojani*

Good growth performance of *A. bornmuelleriana* for dry regions

A. alba good performance for high

A. nordmanniana: bad results

Abies cephalonica



Shared with France INRA and Greece AUTH

1970 - 3 Comparative provenances field tests :

- Londa (Florence - Tuscany)
- Monte Capraro (Isernia - Molise)
- Colle Soda (Pescara - Abruzzo)

sigla	popolazioni	massiccio montuoso	lat.	long.	altitud.	prec.med. annua	temp.med. annua	substrato geologico	specie
Vlah	Vlaika	Mainalon	37°35'	22°11'	1200	1200	---	calc. dol.	<i>A. cephalonica</i>
Kapo	Kapota	Mainalon	37°35'	22°11'	1300	1200	---	calc. dol.	<i>A. cephalonica</i>
Pnas	Parnassos	Parnaso	38°35'	22°30'	1050-1250	1200	10.4	flysch	<i>A. cephalonica</i>
Kolo	Kolokithovrissi	Parnaso	38°33'	22°29'	1250	1200	---	flysch	<i>A. cephalonica</i>
Mevr	Megali Vrisi	Parnaso	38°33'	22°29'	1220	1200	---	flysch	<i>A. cephalonica</i>
Brom	Bromopigado	Parnaso	38°33'	22°34'	1800	1200	---	calcare	<i>A. cephalonica</i>
Koro	Koromilies	Parnaso	38°35'	22°31'	1500	1200	---	calcare	<i>A. cephalonica</i>
Pril	Profitis Ilia	Taigeto	37°05'	22°16'	1450	1300	---	calcare	<i>A. cephalonica</i>
Pesc	Pescopennataro	/Alto Molise	41°50'	14°13'	850-1450	838	7.4	flysch	<i>A. alba</i>

- Total height:: 1977,1982, 1990.....
- DBH in 1990;
- Annual increments: 1973 to 1978;

• Bud phenology in May/June 1978 (Debazac,1965-1967, method):

0 - dormant bud → 4 - young shoot

Populus sp.

Several international international trials were carried out in the past in the framework of the following.....

- **Bacterial and fungal pathogenesis** in relation to EC poplar breeding programmes (FOREST, MA1B 006C).
- Risk evaluation and prevention through **durable resistance** (MA2B CT91 0012)
- Inter disciplinary research for **poplar improvement** (AIR1 CT92 0349)
- **Poplars for farmers** (AIR3 CT94 1753)
- Strengthening of research capacity for **poplar and willow** multipurpose plantation growing in Serbia (STREPOW - FP7 REGPOT 2007-3)

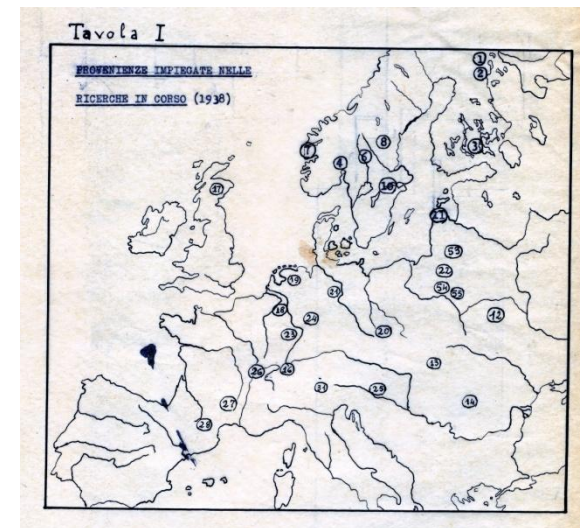
Old trials still existing and
maintained

Pinus sylvestris

International IUFRO TRIALS

- 1938 IUFRO Field test located in Brenna (Como-Lombardy) Lat 45° 40' N Long. 9°10' E
- 1958 National field test 1958 - 1962 located in Caldaro (Bozen) Lat.46°25' 17" Long. 11°13' 00"
- 1958 National field test 1958 - 1962 located in Pievepelago (Bologna) Lat.44°12'Long. 10° 37'

-IUFRO 1938: Provenances from **central Europe** (Germany, Hungary, Tchekia and Belgium) and from **central oriental groups** (Poland, and Germany) showed the best performances for adaptation (*survival*) as well as for *growth*. Concerning *stem form* the best material was the Italian from Olgelsca (stand n. 63 and Val di Fiemme (n. 131).



Larix decidua

In Italy first field trials of *L. decidua* were planted by CRA SEL in 1944 in the frame work of IUFRO programmes. 22 provenances of European larch were used.

No breeding programmes are at present ongoing, being suitable areas for larch restricted to the natural range, requested only selected materials for afforestation in the frame work of traditional mountain silviculture.

Anyway, plots stil exist and can be used for monitoring adaptation etc..



Conclusion

- International trials allow the evaluation of materials based on large environmental range, either for interaction *genotype x environment* for multiple productive and adaptive traits.
- Nowadays, in view of the global change effects, they are **open air laboratories** for studying deeply adaptation and genetics of adaptation and supply information on FGR reactions strategic for mitigation activities and preserving resources *in situ* and *ex situ*.
- Many problems for long term managing, for maintainance, conserving continuity in the time, problems due to changes in people, but now also to the increased ferquence of **extreme events**.



Managing trials, problems of oversized materials!!!...

Pme in Tuscany...☺



Forest fires after the hard drought in 2007,

Pha FAO collection in S Italy.



Caucasus collection lost after extreme rainfalls in spring 2008. Pav in N Italy.

Thank you very much!