HELLENIC AGRICULTURAL ORGANIZATION - DEMETER
DIRECTORATE GENERAL OF AGRICULTURAL RESEARCH

COTTON RESEARCH ASPECTS IN GREECE

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Cotton - Greek national product

- 8 % of total agricultural output
- More than 55,000 farmers
- cultivated area 250000 ha (nearly 50% of the irrigated land)
- 80 % of the EU production

Table 1: Cotton cultivation and production in Greece

Year	Cultivated area (ha)	Yield of seed cotton (1000tn)
2007	331,901	801,0
2008	284,157	670,0
2009	225,751	662,5
2010	257,180	557,0
2011	285,668	796,5
2012	285,716	775,6
2013	248,730	852,4
2014	277,884	814,2
2015*	275,000	-

* estimation

Source: ***Ministry of Rural Development and Food (2000-2009) and OPEKEPE (2010-2014)***

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Sustainable production techniques

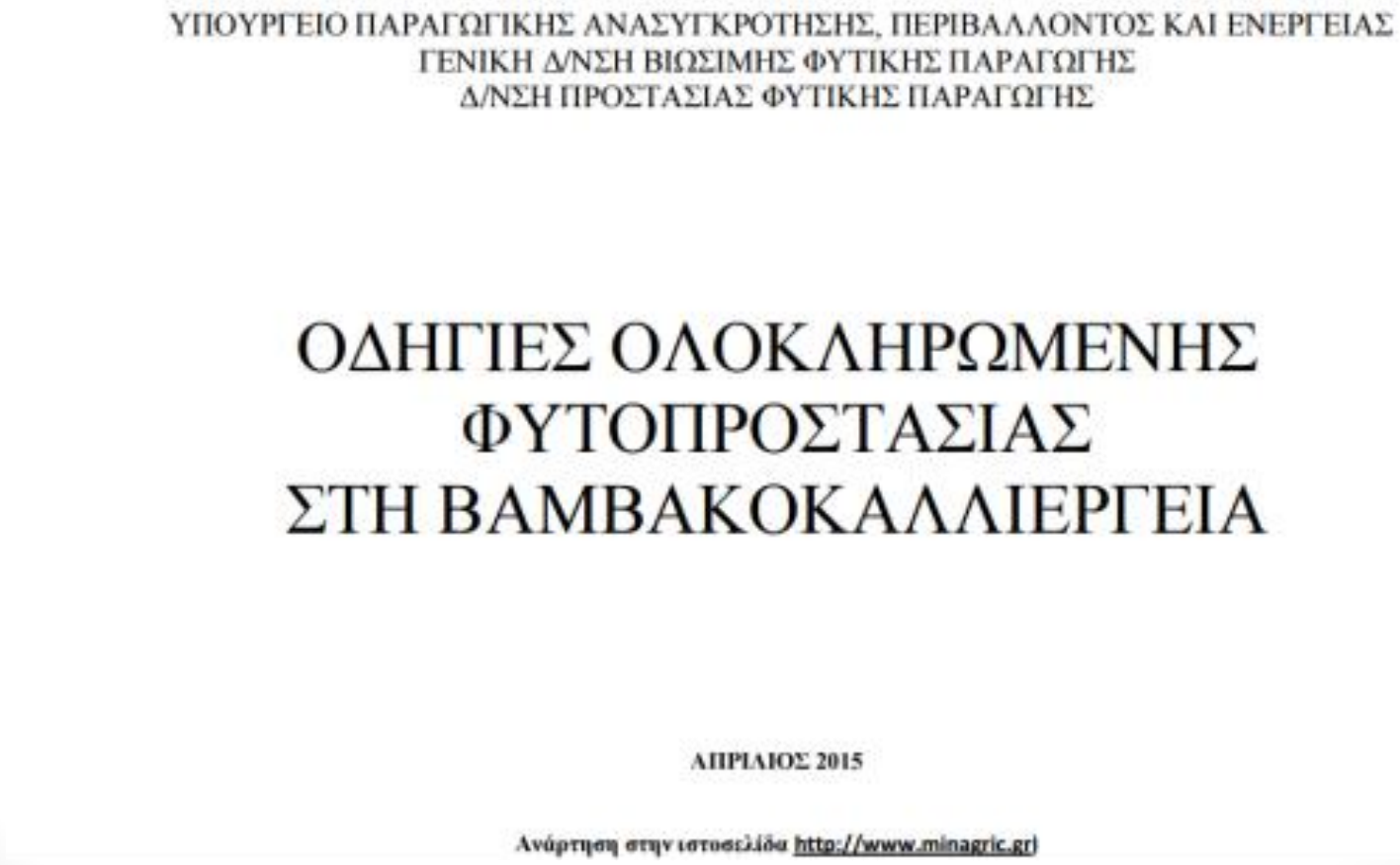
EU Common Agricultural Policy

- biodiversity, crop rotation
- proper use of water,
- good agricultural condition of land,
- reasonable use of inputs,
- public health and
- protection of the farmers and the consumers.

Certified quality national scheme called Agro 2-2 /2

- Integrated Crop Management (ICM) scheme with special requirements for cotton crop production.
- The system covers all stages of cotton production from seed and sowing till harvesting .
- Farmers who meet the requirements are given a certificate by independent control bodies.
- The recent years up to 100,000 ha (over 35% of the total cotton area in Greece) had participated in this voluntary scheme.

The guidelines of Integrated Management System in Cotton are available through the website of the Ministry



ΥΠΟΥΡΓΕΙΟ ΠΑΡΑΓΩΓΙΚΗΣ ΑΝΑΣΥΓΚΡΟΤΗΣΗΣ, ΠΕΡΙΒΑΛΛΟΝΤΟΣ ΚΑΙ ΕΝΕΡΓΕΙΑΣ
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ΣΤΗ ΒΑΜΒΑΚΟΚΑΛΛΙΕΡΓΕΙΑ

ΑΠΡΙΛΙΟΣ 2015

Ανάρτηση στην ιστοσελίδα http://www.minagric.gr

Greece is the largest cotton supplier in EU

- 30 ginning companies - 65 ginning units
- Domestic spinners use 10 % of lint production
- Exports mainly to Turkey but also to Egypt, Sri Lanka and the United Kingdom
- Greece's financial crisis has negatively affected the cotton market, creating risks and uncertainty.

COMMON AGRICULTURE POLICY - CAP

< 10 ha

basic area payment (70%) a green aid (30%).

10 – 15 ha

at least two crops and the main crop < 75 % of the total

> 15 ha "ecological focus area" equivalent to at least 5 % of the total arable area of the farm

OPEKEPE (Payment and Control Agency for Quidance and Quarantee Community Aid)

RESEARCH FOUNDATIONS

- Aristotelian University of Thessaloniki AUTH - Faculty of Agriculture,
- Agriculture University of Athens, AUA
- University of Thessaly - Faculty of Agriculture
- Democritus University of Thrace - Faculty of Agricultural Development
- former Cotton and Industrial Plants Institute - now Plant Breeding and Genetic Resources Institute belonging to HAO – DEMETER
- Centre of Research and Technology Hellas (CERTH) - Institute of Applied Biosciences

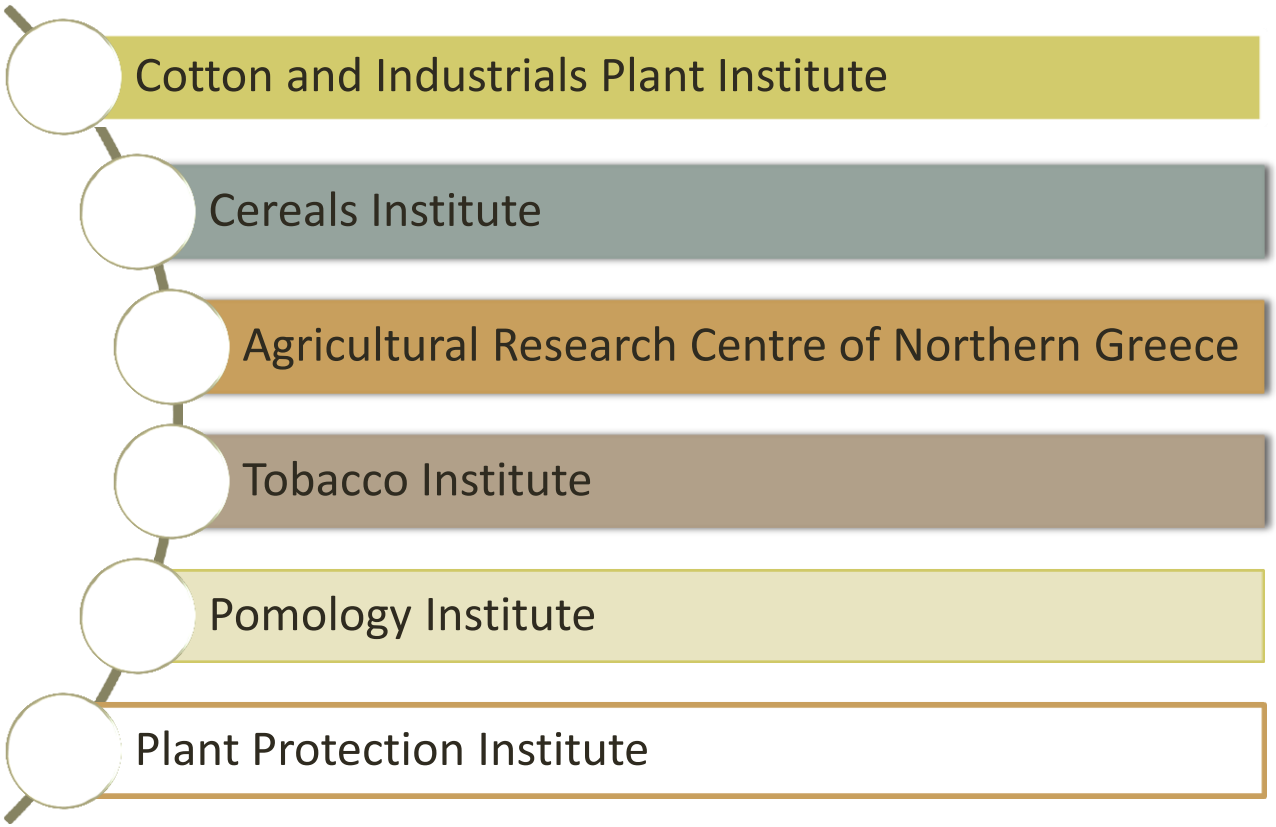
HELLENIC AGRICULTURAL ORGANIZATION - DEMETER

Established in 2011 following the merge of

- National Agricultural Research Foundation -NAGREF
- Organization of Agricultural Vocational Education Training and Employment – OGEEKA DIMITRA
- Organization for Certification and Inspection of Agricultural Products – AGROCERT
- Hellenic Milk and Meat Organization - ELOGAK

Functions as a legal entity of the public sector supervised and financed, more than 51%, by the Greek Ministry of Agricultural Development & Food.

PLANT BREEDING AND GENETIC RESOURCES INSTITUTE



RESEARCH TARGETS

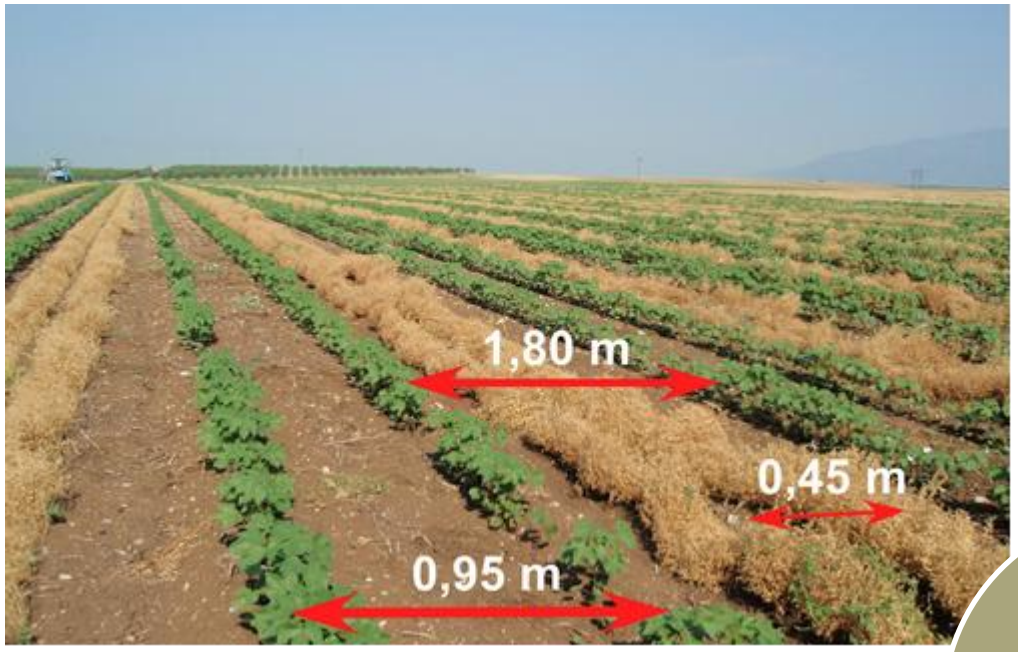
- ✓ Conservation, evaluation and reasonable use of plant genetic resources (including local varieties).
- ✓ Development of new varieties and species with improved performance, quality and adaptability.
- ✓ Field crops (cotton, tobacco, wheat, rice, industrial plants), vegetables, fruits, nuts, aromatic and medicinal plants along with wild and native plants of the Greek flora.
- ✓ Plant protection - weed management.
- ✓ Sustainable and precision agriculture, integrated production management, modern crop protection systems, optimal use of inputs.
- ✓ Lower production cost and environmental protection.

Aspects on cotton research

- Breeding of new varieties
- Co-cultivation with legumes
- Non tillage and strip tillage cultivation
- Irrigation of cotton with municipal waste water

Breeding of new varieties

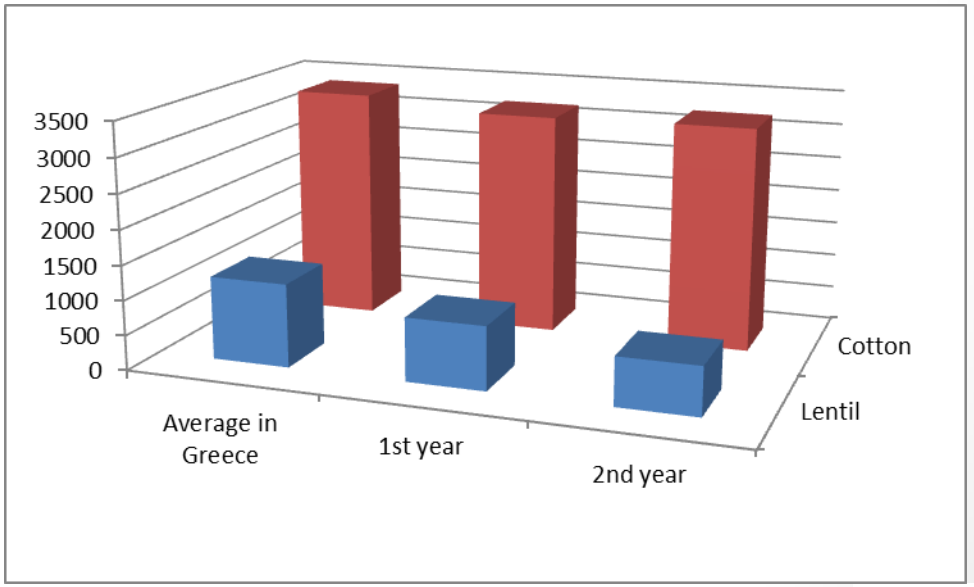
Co-cultivation with lentil



Cultivation area	2.5 ha
Varieties	Greek origin
Row distance	0.95m cotton
	0.45 m legumes
Drip irrigation	Between the two cotton lines

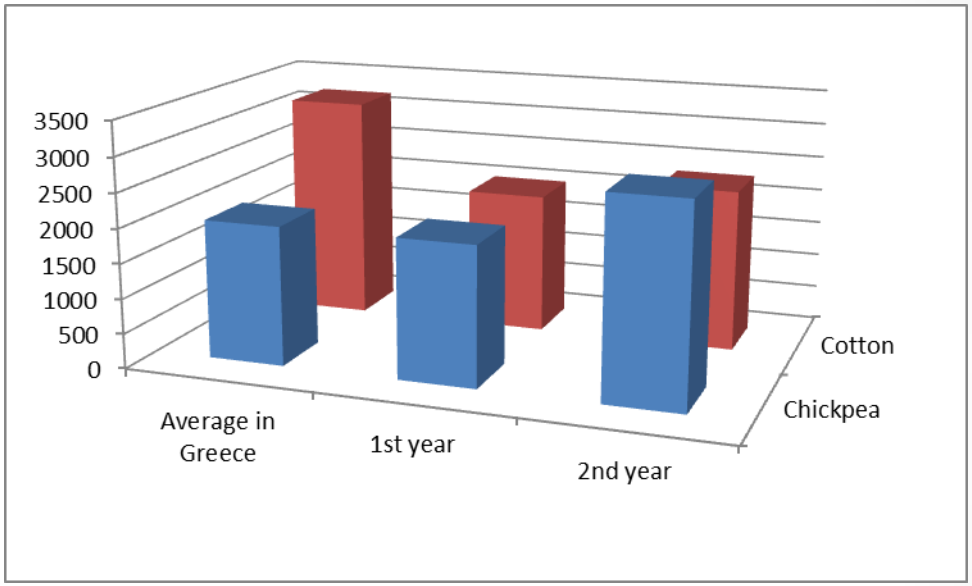
- Soil analysis
- Common cultivation practices
- No fertilizers

Co-cultivation with lentil



Co-cultivation with chickpea

Co-cultivation with chickpea



Results

No use of fertilizers – cost reduction

Satisfactory yield both for lentil and cotton

Satisfactory yield for chickpea but not for cotton

Problems in cultivation practices because the maturing time of chickpea is later than lentil and harvesting

Non tillage and strip tillage cultivation

Non tillage and strip tillage cultivation

Non tillage and strip tillage cultivation

Irrigation of cotton with municipal waste water

Wsp	• Wastewater treated by stabilization ponds and sand filtration, non - chlorinated
Was	• Wastewater treated by activated sludge and chlorination
Wf	• Water fresh from a well, as control

Water quality used for irrigation

Parameters	Units	Wsp	Was	Wf
BOD_5	mgO_2/l	13.4 ± 4.3	18.6 ± 8.8	-
COD	mgO_2/l	117.0 ± 36.3	64.2 ± 27.8	-
TSS	mg/l	32.6 ± 16.5	38.8 ± 8.7	13.1 ± 2.2
pH		8.1 ± 0.25	7.9 ± 0.16	7.6 ± 0.27
EC[1]	dS/m	4.5 ± 0.3	3.3 ± 0.2	1.1 ± 0.13
SAR	$(me/l)^{½}$	9.9 ± 1.0	7.1 ± 0.1	0.3 ± 0.1
B	mg/l	1.2 ± 0.9	1.3 ± 0.9	0.07 ± 0.01
Cd	mg/l	<0.001	<0.001	<0.001
Cu	mg/l	<0.01	<0.01	<0.01
Fe	mg/l	<0.1	<0.1	<0.1
Pb	mg/l	<0.01	<0.01	<0.01
Mn	mg/l	<0.05	<0.05	<0.05
Ni	mg/l	<0.01	<0.01	<0.01
Zn	mg/l	<0.02	<0.02	<0.02

1 The normal EC values of Was ranged between 1.5-2.0 dS/m. The 3.3 dS/m value is a result of the sea intrusion into the sewage system.

Microorganism concentration in irrigation water

Coliforms	Wsp		Was		Wf	
	count/100ml	%	count/100ml	%	count/100ml	%
Total	<1000	34	$15*10^1$-	100	<3	100
	>1000	76	$40*10^2$			
Fecal	<3-10^3	36.8	<3	100	<3	100
	10^3-5.10^3	34.2				
	5.10^3-10^4	13.1				
	10^4-10^5	15.7				
	>10^5	0.2				

Effect of wastewater on agronomical and quality characteristics

Treatment	Seed cotton yield	Lint	Fiber length		Fiber strength P.I.	Micronaire	Mean maturation date	Mean boll weight
	kg/ha	%	2.5%	50%			0=30/9/99	Gr
WspF	3950 α	38.8 α	27.4 α	13.9 α	8.16 α	4.43 α	13.0 α	5.95 α
WspD	4161 α	38.7 α	27.4 α	13.8 α	8.19 α	4.50 α	11.4 α	5.90 α
WasF	4332 α	38.1 α	27.5 α	14.1 α	8.31 α	4.50 α	12.8 α	5.78 α
WasD	4197 α	38.8 α	27.3 α	13.8 α	8.24 α	4.54 α	10.9 α	5.81 α
WfF	3946 α	37.2 α	27.8 α	14.1 α	8.25 α	4.32 α	14.4 α	5.65 α
WfD	3837 α	37.6 α	27.4 α	13.7 α	8.41 α	4.46 α	10.3 α	5.80 α
Wsp	4055 α	38.8 α	27.4 α	13.8 α	8.17 α	4.47 α	12.2 α	5.93 α
Was	4264 β	38.5 α	27.4 α	13.9 α	8.27 α	4.52 α	11.9 α	5.79 α
Wf	3892 γ	37.4 β	27.6 α	13.9 α	8.33 α	4.39 α	12.4 α	5.73 α
F	4076 α	38.0 α	27.6 α	14.0 α	8.24 α	4.42 α	13.4 α	5.79 α
D	4065 α	38.4 α	27.4 α	13.8 β	8.28 α	4.50 β	10.9 β	5.84 α

F= level furrows with blocked ends,
D= drip irrigation

Irrigation of cotton with municipal waste water

- The two effluents resulted in all cases in higher yields and lint outturn compared to the control.
- Fiber quality and other physiological parameters were not affected by water qualities.
- Drip irrigation brought forward maturation almost 3 days.
- No soil deterioration detected relevant to trace elements concentration while salinity and alkalinity should be checked regularly.
- Municipal wastewater can be efficiently used for cotton irrigation provided that monitoring of the effluent and the soil as well as control of pathogens.

Sources

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