THE COMPETITIVE ADVANTAGE OF THE TUNISIAN PALM DATE SECTOR IN THE MEDITERRANEAN REGION

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I. INTRODUCTION

In Tunisia, date-palm cultivation and production are of clear strategic importance in terms of economic, social and environmental development. However, the globalization of markets has had a huge impact on the traditional concept of the comparative advantage enjoyed by Tunisia in date exports, highlighting the necessary determinants for competitiveness in the international scenario, in particular those related to quality and industrial strategies.

In fact, an analysis of the competitive advantage of the Tunisian date industry in the Mediterranean area and Iran over the last 20 years shows that the country is still the main supplier of dates to the EU. The Deglet-Nour variety, in particular, puts Tunisia ahead of traditional competitors such as Algeria and Iran, but it is currently facing new competitors like Israel and re-exporting countries like France. We also report that the industry is currently undergoing several technical problems, including pests and diseases, which represent the main cause for rejection of this product in the EU, and constitute by far the most important phytosanitary problems facing both production and export of dates.

New business strategies (conditioning, new non-chemical treatments, packing, opening new markets, new distribution channels) would be positive responses to tackle current market limitations, the emergence of new producers and restrictive EU policies.

II. OBJECTIVE:

This work **aims** to analyze the competitive position of a strategic sector in the Tunisian economy: the date-production sector in relation to its main competitors in the Euro-Mediterranean area and Iran.

III. METHODOLOGY:

The study focuses on the competitiveness of Tunisian dates in the Mediterranean region and Iran in international markets. Methodology was as follows:

- Analysis of Balassa's Revealed Comparative Advantage Index (RCAI).

$$RCAI_{ij} \text{ or } BIS_{ij} =$$

- Dependency Ratio (DR):

$$DR_{ij} =$$

- Constant Market Share (CMS):

$$CMS_{ij} \text{ or } PM_{ij} =$$

II. IV. RESULTS AND DISCUSSION: Table 1. Analysis of no-price competitiveness of dates in the Mediterranean and Iran

Country	Tunisia	Iran	Israel	France	Egypt	Algeria	Italy	Jordan	Turkey	Morocco	Spain	Mediterranean
Specialization index (RCA or BIS)												
1991-95	6193,70	2741,62	632,83	29,51	206,91	30213,42	1,54	138,75	1,61	44,57	3,09	100
1996-00	7345,41	2188,16	305,01	36,65	170,38	35330,78	2,79	60,37	6,57	4,55	2,81	100
2001-05	6693,99	1428,91	1127,40	26,43	77,58	13713,10	2,30	137,45	7,81	6,51	2,06	100
2006-10	5390,84	1260,25	1052,64	18,22	173,30	6720,16	5,12	149,14	8,52	1,17	2,20	100
Averages	6405,99	1904,74	779,47	27,70	157,04	21494,37	2,94	121,43	6,13	14,20	2,54	100
Dependency index (DI)												
1991-95	10,69	0,00	0,00	201,13	28,66	2,24	76,25	506,68	26,67	158,22	79,68	100
1996-00	17,51	0,00	0,02	189,01	7,49	0,15	71,98	379,33	38,53	373,25	99,39	100
2001-05	26,17	0,25	0,04	125,06	5,53	0,35	46,65	343,69	54,86	1877,56	66,50	100
2006-10	15,16	0,00	0,43	105,47	14,52	0,03	42,87	304,99	77,38	1921,16	58,00	100
Averages	17,38	0,06	0,12	155,17	14,05	0,69	59,44	383,67	49,36	1082,55	75,89	100
Constant market share (CMS)												
1991-95	36,63	32,6	10,25	14,45	1,27	30,67	0,28	0,36	0,08	0,38	0,44	100
1996-00	40,12	26,95	4,27	16,33	1,07	22,77	0,53	0,23	0,35	0,04	0,49	100
2001-05	43,44	21,24	13,4	10,66	0,75	8,26	0,48	0,66	0,41	0,06	0,42	100
2006-10	43,95	25,57	13,11	6,72	2,56	4,76	1,06	0,87	0,48	0,01	0,44	100
Averages	41,04	26,59	10,26	12,04	1,41	16,62	0,59	0,53	0,33	0,12	0,45	100

V. Conclusions:

Given the analysis of this sector's competitiveness within the Mediterranean basin and Iran, we conclude that Tunisia has a highly important trade position within the Mediterranean. Nonetheless, recent years have seen a decline in this comparative advantage due to declining competitiveness indices.

However, the market share indices (constant part of the market) are more stable, with a slight upward trend. This indicates that Tunisia is maintaining its market within the Mediterranean, and is well above the index of all competing countries throughout the period analyzed. This highlights the importance of the Tunisian date in the Mediterranean and Iran.

Tropic Fruit Consumption in Turkey

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INTRODUCTION

In recent years, new products have been began to take its place in shelves, racks and dining table in Turkish fruit market. Kiwi, avocado, pineapple, coconut, Pepino, cashew nuts beside papaya, guava, pomelo have been entered to Turkish market in recent years. Banana, kiwi, avocado and pepino are produced commercially, but guava, pitaya and passiflora are produced in the limited area for the adaptation study in Mediterranean strip. Demand for these products, including tropical fruits with limited production, is also increasing. Total production quality of avocado was 11 tons in 2010 and this value increased 18 tons 2014. Similarly production quality of kiwi was 300 tons in 2010 and this value increased 317 tons in 2014. The import of some products, which its production began for adaptation study, has been increased in recent years. These products imported as fresh and also have been take its place in market as canned and chopped foods. Turkey imported pineapple, mango, guava, avocado, kiwi, cashew, coconut, papaya, pomelo, it's worth 49.5 million dollar in 2014.

MATERIALS and METHODS

This study includes data from surveys conducted with 387 households in Adana province to determine the tropical fruit consumption in households.

RESULTS

The factors that affect the recognition, consumption and purchase frequency of tropical fruits were determined by surveying the perception and attitude of the consumers. High recognition rate of tropical fruits (83.7%) was found. There are statistically significance ($p<0.05$) between recognition of tropical fruit and numbers of children, income and chronic disease. But there is no statistically significance between recognition of tropical fruit and gender (Table1). Except bananas and kiwi fruit, pineapple (42.4%), coconut (17.3%) and avocado (14.8%) were the most consumed fruits. Pitaya, with the least recognition, has no consumption (Table 2). The high price of tropical fruits is one of the biggest reasons for not consuming these products. The lack of availability and habits are important reasons as well. (Table 3).

Table 1. Recognition of Tropical Fruits

Variable	Consumption Status	Attendance		X^2	df	P
		Yes	No			
Gender	Female	142	25	0,369	1	0,37
	Male	182	38			
Income	<1000	8	1	23,78	5	0,00
	1001-2000	98	37			
	2001-4000	155	24			
	40001-6000	36	1			
	6001 ve üstü	27	0			
Number of Children	None	101	17	17,79	6	0,01
	1	76	11			
	2	99	15			
	3	35	9			
	4 and more	11	8			
		2	2			
Chronic Diseases	Yes	87	237	27,01	1	0,00
	No	38	25			

Table 2. Recognition and consumption of tropical fruit

Fruit	Recognition (%)	Consumption (%)
Pineapple	94,1	42,4
Avocado	83,7	14,8
Kiwi	99,5	90,2
Mango	70	7,8
Banana	99,7	99
Papaya	27,4	0,5
Passiflora	15,8	0,3
Pepino	25,3	2,1
Pica	5,2	1,3
Pitaya	3,6	0
Pomelo	4,1	0,3
Coconut	97,2	17,3

Table 3. The reasons for no consumption tropical fruit

Reasons	Yes	No	No idea
I think that its tastes isn't good	22,50	50,90	26,60
Very expensive	74,70	18,10	7,20
They are not sold in shopping place	81,70	15,20	3,10
I do not have the habit	93,80	5,90	0,30
Our domestic products is more important	66,90	29,70	3,40
There is no differences than other fruit	20,70	70,50	8,80
I think that not healthy	15,00	77,00	8,00
I don't trust because that imported mostly	32,60	58,10	9,30
Views do not appeal because it is different	17,10	66,70	16,30

Factor Analaysis

Consumers' attitude was examined using a scale contain of 25 items. And factor analysis was performed. The internal consistency coefficient Cronbach Alfa of the scale was 0.882 and KMO measure of sampling adequacy was found to be 0.848. These values showed that datas were suitable for analysis. As a result of analysis, the scale consists of 7 factors explaining 62.70% of total variance (Table 4). First factor explained 24.90% of total variance and it was named as health. Second factor was named as traditionalism and it explained 11.20% of total variance. Third factor was named as selective diet. And other four factor according to the factor loading were named as curiosity, innovativeness, visuals and food perception.

Table 4. Result of Factor Analysis

Factors	Eigenvalues	Variance	Total Variance
Health	6,2	24,9	24,9
Traditionalism	2,8	11,3	36,2
Selective diet	1,6	6,5	42,7
Curiosity	1,4	5,7	48,4
Innovativeness	1,4	5,3	53,7
Food Perception	1,2	4,6	58,3
Visuals	1,1	4,3	62,6

In order to increasing amount of tropical fruit consumption in Turkey, it is necessary that increasing production so taking down the price accordingly supply amount.

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Distribution and health condition of old European chestnut (*Castanea sativa* Mill.) orchards in Slovakia

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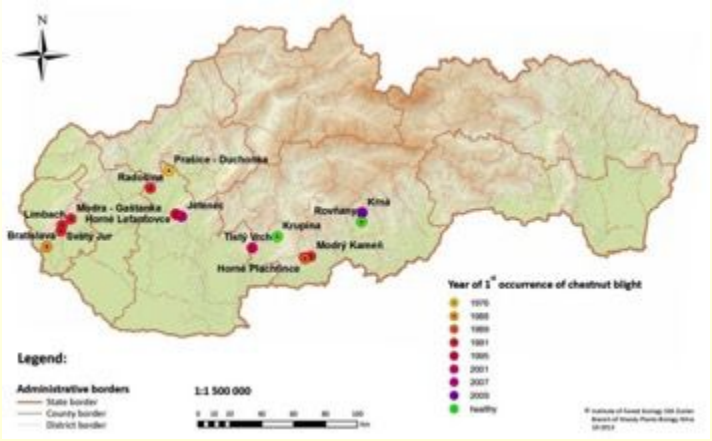
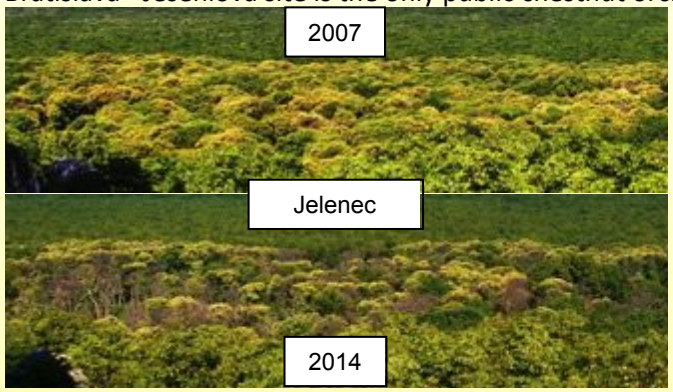
European chestnut (*Castanea sativa* Mill.) is one of the oldest non-native woody plant species in Slovakia. Chestnut occurs here mostly in extensive old orchards or forest stands. Currently, the health condition as well as chestnut production has rapidly declined as a result of enormous dying out of chestnut individuals infected by fungus *Cryphonectria parasitica* (Murr.) Barr. During last decades the fungus gradually spreaded at all chestnut localities.

The three major introduction centres of chestnut distribution with supposed introduction period:

1. Bratislava (Roman era)
2. Jelenec (13th century)
3. Modrý Kameň (16th-17th century)



Bratislava - Jesániova site is the only public chestnut orchard in capitol city of Slovakia.



Jelenec was originally an orchard, which was gradually transformed into forest. There is a very high density of trees. It is protected area and the largest compact chestnut stand in Slovakia.

Modrý Kameň region is area with the biggest chestnut production in Slovakia.

AN UPDATE OF EFSA'S DATABASE ON HOST PLANTS OF XYLELLA FASTIDIOSA

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Introduction

- *Xylella fastidiosa*, a vector-transmitted bacterium, is associated with important diseases in a wide range of plant species and is regulated as harmful organism in the EU.
- In Europe the disease was reported in 2013 in Apulia, southern Italy and in 2015 in Corsica and southern France.
- EFSA was requested by the European Commission to create and periodically update a database of the host plants of *X. fastidiosa*.
- The first publication of the database, including the categorization of host plants, was in April 2015.
- Then, an extensive literature search approach was used for updating the database including papers and reports published until 20th November 2015.

Methodology

1st step: Extensive literature search → **2nd step:** Relevance screening → **3rd step:** Data extraction

Results

- The updated list consists of **359 plant species** (including hybrids) from **204 genera** and **75 different botanical families**.
- Compared to the previous database, **44 new species** and **two new hybrids**, **15 new genera** and **5 new families** of plants were included.
- The majority of the new species (70%) were found in Apulia, Corsica and southern France.
- Update on the distribution of *X. fastidiosa* host plant species in Europe and worldwide (Figure 1, 2).

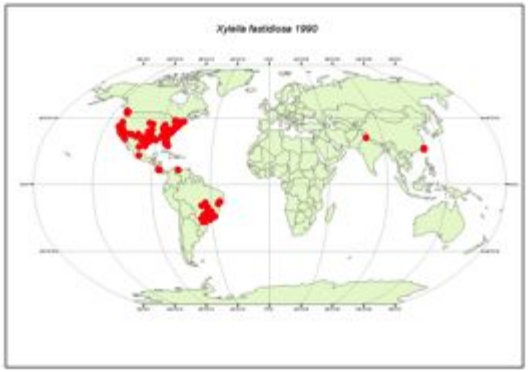

Figure 1. Distribution of *X. fastidiosa* host plants in 1990.

Figure 2. Distribution of *X. fastidiosa* host plants in 2015.

Monitoring plant growth in a flowering (*Rosa chinensis*) and non-flowering (*Ficus benjamina*) ornamental

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Problem statement

Measure stem diameter variation, leaf thickness variation and sapflow of small ornamentals

Objective

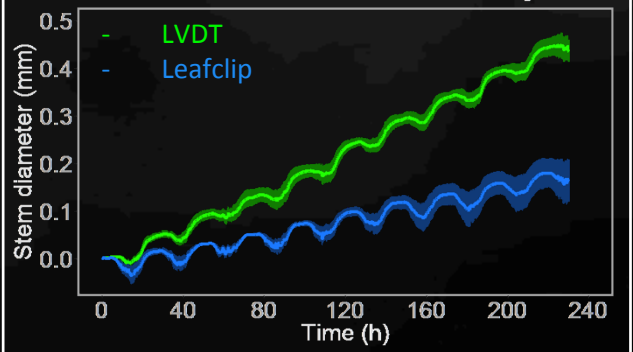
Select an optimal sensor set for small ornamentals

Stem diameter variation

LVDT

Leafclip on stem

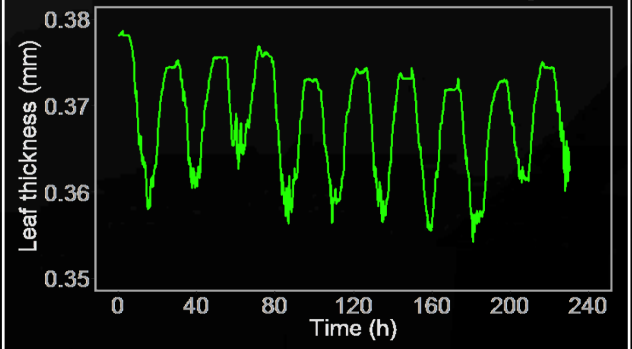
Stem diameter variation of *Ficus benjamina*



Leaf thickness variation

Leafclip on leaf

Leaf thickness variation of *Ficus benjamina*

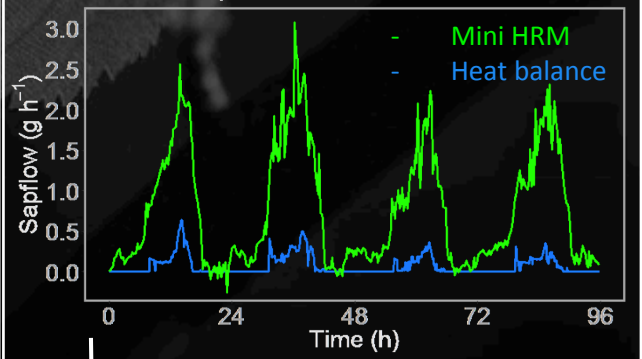


Sapflow

Heat balance

Mini HRM

Sapflow of *Rosa chinensis*



In practice?

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Morphometric and Physicochemical analysis of watermelon cultivars grown in Malta

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Aim

The aim of this study was;

- to characterize the watermelon cultivars; Pixie, Constitution and Polimore, widespread cultivars in the production of seedless watermelon in Malta.
- to evaluate quality parameters of mini and medium-sized watermelons and the relation between agronomic quality parameters with health promoting compounds, hence the adaptability of grafted watermelon cultivars to the climatic and agronomic practices on the island.

Methodology

Triploid watermelon Pixie and Constitution as well as diploid watermelon cultivar Polimore were cultivated during two growing cycles. Transplant dates were 15 of April and 15 of May . Prior to transplant these cultivars were grafted in a professional nursery on Macis rootstock. At harvesting a number of fruit were sampled and taken to the lab for the following determinations; weight, shape (lenght/ width ratio) and for qualitative parameters, pH and conductivity - pH/ Conductivity meter (Thermoscientific Orion Star A215) Titratable acidity – Titrimetric analysis (SI Analytics Titroline Easy), Total soluble solids (Brix) – Refractometer (Atago), Polyphenols – Folin-Ciocalteu test (Attard, 2013) and Lycopene – Spectrophotometric method (Fish et al, 2012).

Parameter	Range
pH	5.19-5.78
Conductivity	2498-2928 µS/cm
Titratable Acidity	0.555-0.932 5 g/l
Brix	9.613-10.55 %
Lycopene	0.525-0.097 5 %w/w d.w.
Polyphenolic content	0.741-1.762 % w/w d.w.

Results and Discussion

Results show that the Constitution (5450 g) had superior weights to the Pixie (3262g) watermelons ($p<0.001$). This was also exhibited in the lengths ($p<0.0001$) and widths ($p<0.001$) of these two particular cultivars. The conductivity, pH, titratable acidity, Brix and lycopene did not show any significant differences for the three cultivars at the two transplanting dates. However, there was a significant difference between the Constitution and the other two cultivars ($p<0.01$) for their total polyphenolic (0.741-1.762% w/w d.w.) content.

Variables	Length	Width	LW ratio	Cond	Brix	pH	TA	Lycopene	PolyPhenols	%DM
Weight	0.953	0.940	0.264	0.276	0.168	0.322	-0.088	0.099	0.138	-0.024
Length		0.937	0.423	0.264	0.121	0.403	-0.189	0.046	0.161	-0.038
Width			0.082	0.210	0.206	0.343	-0.116	0.104	0.188	-0.057
LW ratio				0.193	-0.205	0.270	-0.264	-0.125	-0.021	0.028
Cond					0.234	0.052	0.439	-0.321	-0.061	0.097
Brix						0.158	0.349	-0.300	-0.427	0.476
pH							-0.691	-0.051	0.232	-0.086
TA								-0.191	-0.390	0.373
Lycopene									0.498	-0.579
PolyPhenols										-0.866

Correlation statistics revealed length, width and weight were positively ($r>0.937$), titratable acidity and pH negatively correlated with each other ($r=-0.691$). However pH correlated with the morphometric parameters in a positive way. Lycopene and total polyphenols were positively correlated with each other ($r=0.498$), but both correlated negatively with % dry matter and Brix content ($r<-0.300$). A positive correlation was shown between % dry matter and Brix content ($r=0.476$). Principal component analysis showed a distinctive discrimination between the Constitution cultivar vis-à-vis the other cultivars.

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Attard E. (2013). A rapid microtitre plate Folin-Ciocalteu method for the assessment of polyphenols. Central European Journal of Biology. 8(1):48-53. DOI: 10.2478/s11535-012-0107-3

Study on Boimertical Idicators of Fresh Fruits of Bulgarian and Introduced Plum Cultivars of Prunus Domestica L.

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Introduction

The main plum growing regions in Bulgaria are four:

-Central Balkan Mountain region
-East Balkan Mountain region
-West Balkan Mountain region
-Sredna Gora region

The most popular cultivar in Bulgaria

'Stanley', followed by 'Čačanska lepotica', 'Althan's Gage', 'Gabrovska'

The Experimental Station – Dryanovo, Bulgaria

Introduced plum cultivars: Stanley, Opal, Ontario, Hramova rencloda, Althan's Gage
Čačanska lepotica

Bulgarian plum cultivars:
Balvanska slava, Gabrovska, Gulyaeva, Strinava

Materials and Methods

The observation was conducted in the period 2014-2015.

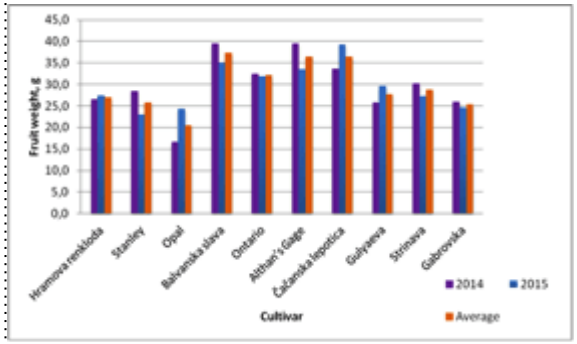
Fresh fruits from 6 introduced plum cultivars were examined and 4 Bulgarian cultivars.

Biometrical Indicators - fruit sizes, arithmetic mean diameter, geometric mean diameter, fruit weight, stone weight and dry matter

Cultivar	Average sizes-mm					
	Length	Width	Thickness	Geometric mean diameter Dg, mm	Arithmetic mean diameter – Da, mm	Surface, cm²
Stanley	46,21	35,55	35,74	38,87	39,17	47,43
Strinava	43,22	35,99	34,92	37,87	38,04	45,03
Gabrovska	42,76	33,82	31,68	35,78	36,09	40,20
Gulyaeva	42,03	35,02	34,12	36,89	37,06	42,74
Balkanska slava	47,8	38,18	37,86	41,03	41,28	52,87
Hramova renkloda	35,88	37,23	34,12	35,72	35,74	40,06
Opal	33,26	30,4	30,46	31,34	31,37	30,85
Ontario	37,78	35,84	36,45	36,68	36,69	42,24
Althan's Gage	38,42	41,02	40,8	40,06	40,08	50,39
Čačanska lepotica	44,55	36,72	36,46	39,07	39,24	47,93

Result and discussion

Fig.1. . Average value of fruit weight for different years in the period :



Conclusion: Cultivars can be divided in the following groups: Large-size, average-size, small-size fruit

IMPACT OF COMPOSTED WASTE PAPER CASING IN *COPRINUS COMATUS* CULTIVATION

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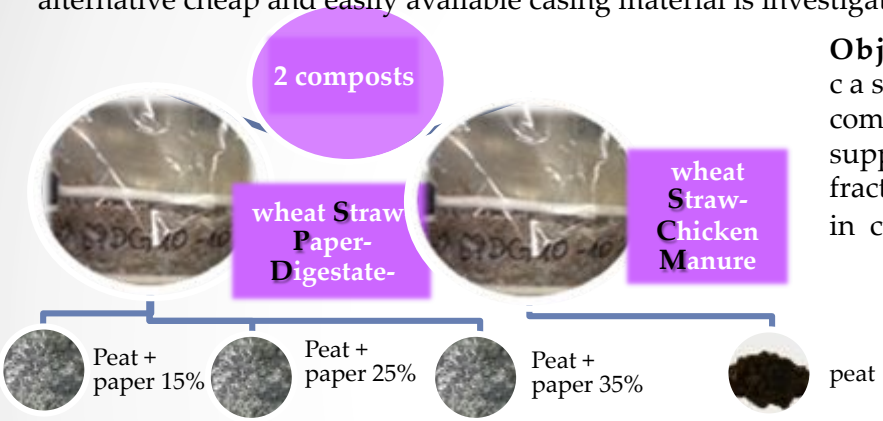
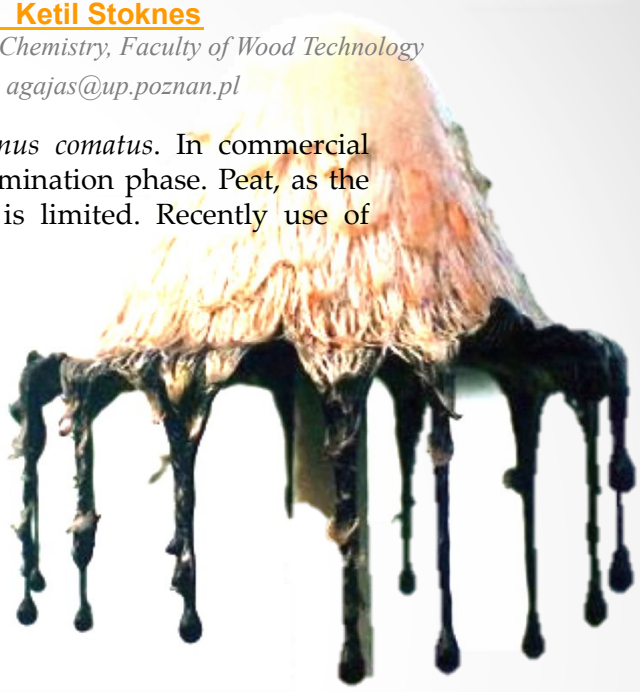
Casing material is crucial element of obtaining high quality yield in cultivation of *Coprinus comatus*. In commercial cultivation, carpophores appear on the surface of casing material covering compost after germination phase. Peat, as the most common casing material is "slow-renewable" factor and its geographic availability is limited. Recently use of alternative cheap and easily available casing material is investigated.



Objective: applicability of casing material from composted waste office paper supplemented with AD liquid fraction as an addition to peat in cultivation



Substrat and casing type	Fruiting bodies	Casing				
	Yield (g/3k substrate)	DM (%)	DM (%)	C (%)	N (%)	Organic Matter (%)	pH
SCM+Peat	97	6	21	14	0,7	47	7,5
SPD +Peat/Paper 15%	250	8	26	18	0,53	40	7,8
SPD +Peat/Paper 25%	287	12	30	21	0,46	31	8,1
SPD+Peat/Paper 35%	350	16	37	25	0,28	27	8,3

Results: Composted waste paper could be used as alternative casing material in cultivation of *Coprinus comatus*.

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Electrical Conductivity Relates Seed Germination in Leek

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Abstract

Electrical conductivity (EC) is a seed test used to predict seed vigour in different crops. Recently, it is for estimating seed germination in cabbage and *Brassica* family. This work is conducted to test whether it can be used as a indicator of seed germination potential of leek seeds (*Allium ampelosprasum var. porrum*). Seeds were aged artifically at 45°C with 20% seed moisture contents during 96 hours, and seed radicle germination varied between 96 and 7%. EC measurements were done on 50 seeds of 4 replicates. Each replicate was soaked in 40 ml in distilled water over 24 hours at 20 °C. In germination test ISTA rules were followed in germination test conditions. EC values were changed beetwen 235,1 and 378,3 µS/cm^{-1}/g^{-1}. Regression analysis showed that radicle germination percentages significantly related to (R^2=0,99, P<0,001) EC values. In the second stages of the study the relationship beetwen EC and seed germination of commercially available leek seed lots will be tested.

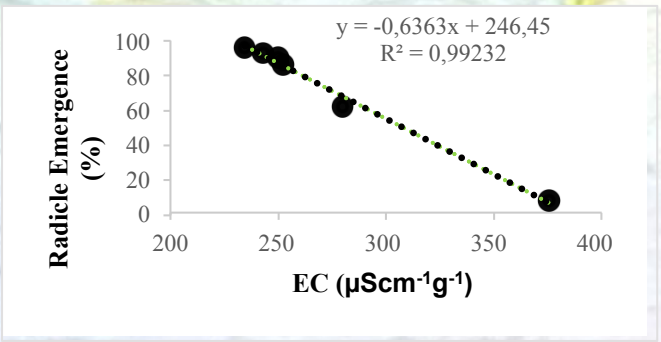
Key words: Seed aging, seed quality, conductivity

MATERIALS AND METHODS

Table 1. The effect of aging on germination percentages, (total, normal, abnormal and dead seeds) mean germination time of leek seeds

Treatments	Total Ger.(%)	Normal Ger. (%)	Anormal Seeds (%)	MGT (day)	Dead Seeds (%)
Control	96a	75a	21	4,2	4
12 H	93ab	70b	23	4,3	7
20 H	90b	61c	29	4,4	10
28 Hours	86c	48d	38	4,5	4
46 Hours	62d	44e	18	6,0	38
96 Hours	7e	0f	7	-	93

Figure 1. The relationship between total germination and EC values in leek seeds



RESULTS

Germination percentages were changed beetwen 96 and 7%. Among the 6 different treatments, the highest seed germination percentage was obtained from Control treatments with 96 (Table 1). EC values were changed beetwen 235,1 and 378,3 µS/cm^{-1}/g^{-1}. Among the 6 different treatments, the highest EC measurement was obtained from seeds kept for 96 hours at 45 °C with 378,3. Regression analysis showed that radicle germination percentages significantly related to (R^2=0,99, P<0,001) EC values (Figure 1).

Air stimuli induce compact plant growth

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Introduction and Objective

- The effect of repetitive mechanical impacts on plant morphology was firstly described by Jaffe (1973) and named 'thigmomorphogenesis'. This principle can be used to alter the habitus of plants.
- The main goal of this project is to avoid or at least reduce the use of synthetic plant growth regulators (PGRs) in greenhouse cultivation of ornamentals and to completely replace PGRs in the production of herbs or organic products, where their use is not permitted.

Materials & Methods

- Use of a custom-built "forced air device" (Knecht, Germany) in all greenhouse trials (see Fig. 1).
- Greenhouse crops are treated by moving nozzles with pressurized air (1-1.5 bar) for 3-4 hours and 60-80 passages per day over the plants.

Fig. 1: „Forced air device" treating *Campanula 'Merrybell'* (Fleischle Company, Germany)

Results

During an experimental period of two years the key results are that plants treated with the "forced air device" had

- shorter but thicker main shoots;
- showed a higher proliferation rate of lateral buds hence a greater number of side shoots;
- an enhanced root system when compared to control plants.

Campanula ‚Merrybell'

- **25 % reduced plant height**
- **35 % reduced shoot length**
- **40 % increased ethylene production**

control **treated**

Solanum lycopersicum ‚Romello'

- **35 % reduced plant height**
- **40 % reduced shoot length**

control **treated**

Outlook

The physiological mechanisms leading to these observed morphological changes are also investigated.

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BÖLN Bundesprogramm Ökologischer Landbau und andere Formen nachhaltiger Landwirtschaft

Regulation of flowering in strawberry
Woodland strawberry as a model

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Background

Strawberry is a facultative short day (SD) plant;

15-18°C and SD
< 13°C

> 21°C

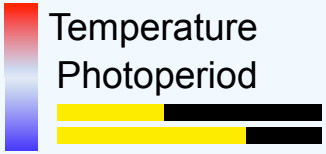
Repressor gene *FvTERMINAL FLOWER1 (FvTFL1)* causes seasonal flowering[1].

Under long day at 18°C (LD) *SUPPRESSOR OF OVER-EXPRESSION OF CONSTANS (FvSOC1)* activates *FvTFL1* to inhibit flower induction[2]

Ever-bearing accessions are LD plants since they lack functional FvTFL1.

How environmental cues regulate flowering in woodland strawberry?

Materials and methods



Temperature
Photoperiod

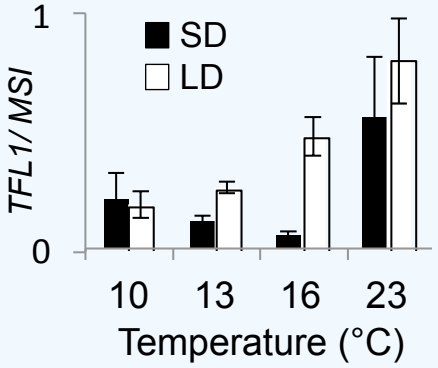
Light quality

Developmental stage at flowering
qPCR
Transgenic plants

Results

Fv FLOWERING LOCUS T1 (FvFT1) mediates light signal; LD and far-red light up-regulates *FvFT1*.

In the absence of FvTFL1, *FvFT1* activates flowering.



FvFTox LD accession

FvTFL1 -expression correlates with flowering. Silencing of *FvTFL1* results flowering at 23°C.

High temperature activates *FvTFL1* independently of *FvSOC1*.

Photoperiod pathway is *FvFT1-FvSOC1* dependent.

***FvTFL1* integrates photoperiod and temperature signals to repress flowering.**

1) Koskela et al. 2012; 2) Mouhu et al. 2013.

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ELICITORS CAN INCREASE TOMATE TOLERANCE TO HIGH TEMPERATURE

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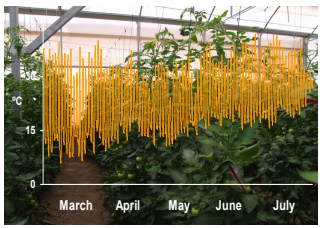
Increased air temperature is one of the factors associated with global climate change that may largely affect productivity and quality of horticultural crops

Elicitors are molecules that induce plant defense systems to abiotic or biotic stresses (cross-tolerance)

The aim of this work is to increase tomato yield under high temperature conditions without affecting fruit quality by using elicitors



Tomato plants were grown in SE Spain in a greenhouse during the winter to summer season (day temperatures up 42 ºC). Plants were sprayed 110, 115 and 126 days after transplant with methyl jasmonate (MJ) 100 and 1000 µM, salicylic acid (SA) 50 and 200 µM, chitosan (CH) 0.1 and 1 g L^{-1} and 2,4-epibrassinolide (BRs) 10 and 30 µM

All the elicitors treatments increased total fruit yield although this effect was only significant for SA, BR (at both low and high doses) and CH (at low dose). This increase was due to an increase of the number of fruits, fruit weight or both parameters

ELICITOR	DOSES	YIELD (kg plant-1)	FRUIT NUMBER	MEAN WEIGHT (g)
MJ	0	3.98	44.7^{a}	93.5^{b}
	100 µM	4.03	55.5^{b}	75.5^{a}
	1000 µM	4.53	53.2^{b}	95.2^{b}
		ns	**	*
SA	0	3.98^{a}	44.7^{a}	93.5
	50 µM	4.73^{b}	55.8^{b}	86.2
	200 µM	4.78^{b}	52.2^{b}	94.3
		***	**	ns
CH	0	4.05^{a}	47.8^{a}	86.5^{ab}
	0.1 g/L	4.13^{a}	52.8^{ab}	80.2^{a}
	1 g/L	5.15^{b}	56.0^{b}	95.5^{b}
		**	**	**
BR	0	3.47^{a}	46.5^{a}	72.2^{a}
	10 µM	4.73^{b}	54.8^{ab}	85.1^{b}
	30 µM	4.66^{b}	57.5^{b}	83.6^{b}
		**	*	**

ELICITOR	DOSES	VITAMIN C (mg g^{-1})	LYCOPENE (µg g^{-1})	β-CAROTENE (µg g^{-1})	HIDROXIC. ACIDS (µg g^{-1})	FLAVANONES (µg g^{-1})	FLAVONOLS (µg g^{-1})
MJ	0	25.8^{b}	18.1	9.4	25.4	23.9^{b}	11.8
	100 µM	21.4^{a}	22.1	10.0	25.3	16.9^{a}	10.7
	1000 µM	20.9^{a}	22.0	8.7	21.9	13.8^{a}	8.9
		*	ns	ns	ns	**	ns
SA	0	25.8^{b}	18.1^{a}	9.4	25.4	23.9	11.8^{ab}
	50 µM	22.3^{ab}	24.0^{b}	8.0	25.9	29.8	13.8^{b}
	200 µM	20.6^{a}	18.7^{ab}	7.8	22.2	23.5	9.4^{a}
		*	*	ns	ns	ns	*
CH	0	24.0^{b}	19.5	11.0^{b}	25.4	23.9^{a}	11.8
	0.1 g/L	22.7^{ab}	16.8	9.8^{ab}	25.4	38.8^{b}	12.1
	1 g/L	20.7^{a}	14.3	8.2^{a}	20.3	23.8^{a}	9.1
		*	ns	*	ns	*	ns
BR	0	24.9^{b}	18.1	9.4	25.4^{b}	23.9^{b}	11.8^{b}
	10 µM	16.4^{a}	19.2	8.9	19.2^{ab}	16.6^{a}	9.3^{a}
	30 µM	16.3^{a}	19.5	8.1	17.4^{a}	16.2^{a}	8.7^{a}
		*	ns	ns	*	*	***

The beneficial effect of treatments has different effect on the concentration of health-related metabolites:

- In general, concentration of carotenoids, the main metabolites related to heath benefits of tomato, was not affect by the elicitors treatments, except for treatments with 50 µM SA and 1g/L CH that increased lycopene and decreased β-carotene, respectively

- Regards hydrophilic compounds, all the elicitors decreased vitamin C concentration. The effect on phenolic compounds was highly depending on the nature and the dose of the elicitor. In general, increased yield was correlated with decreased phenolic compound concentration, except for 0.1 g/L CH, that significantly increased flavanones concentration