EUREKA project 5885! SQAH

/Czech-English cooperation 2011-2014/

Development of sustainable quality aroma dwarf hops in both the CR and the U.K. to supply brewing worldwide

Vyšlechtění jemných aromatických odrůd českého a anglického chmele vhodných pro pěstování na nízkých konstrukcích

s celosvětovým uplatněním při výrobě kvalitního piva

Ing. Vladimír Nesvadba, Ph.D. a Ing. Josef Vostřel, CSc.
Hop Research Institute Ltd., Žatec

Project partners

Czech Republic

Hop Research Institute Ltd., Žatec

Vladimír Nesvadba, Josef Vostřel

United Kingdom

Philip Davies & Son, Dormington, Hereford

Peter Glendinning

Wye Hops Limited, **Canterbury, Kent**

Peter Darby

Main advantages

1. Very large reduction of the demand of casual labor
2. Significant reduction of agrochemicals – lower environmental impact
3. Harvesting is performed by a mobile picking machine offering more flexible operation and producing higher quality crop.

Activities

1. **Selection of perspective parental components**
2. **Assessment of progenies and selection of the best genotypes**
3. **Assessment of the best genotypes in field trials**
4. **Registration trials**

Researchers and technicians involved

Necessary equipment:
Glasshouses, hop gardens,
laboratories, pilot brewery

Research team – 17 empoloyees (5 Dept.)):
Breeding – Nesvadba, Polončíková, Henychová, Hervert, Krejčíková, Oppelová, Špánková
Hop protection – Vostřel, Zahrádková
Molecular biology – Patzak, Henychová
Chemistry – Krofta, Vrabcová, Mravcová
Agricultural techn. – Ježek, Kozlovský, Karban

Area: **2011 – 6 NK = 3.5 ha**
2012 – 8 NK = 4.9 ha
2013 – 8 NK = 5.1 ha
2014 – 9 NK = 6.3 ha
55,000 seeds
28,000 seedlings.

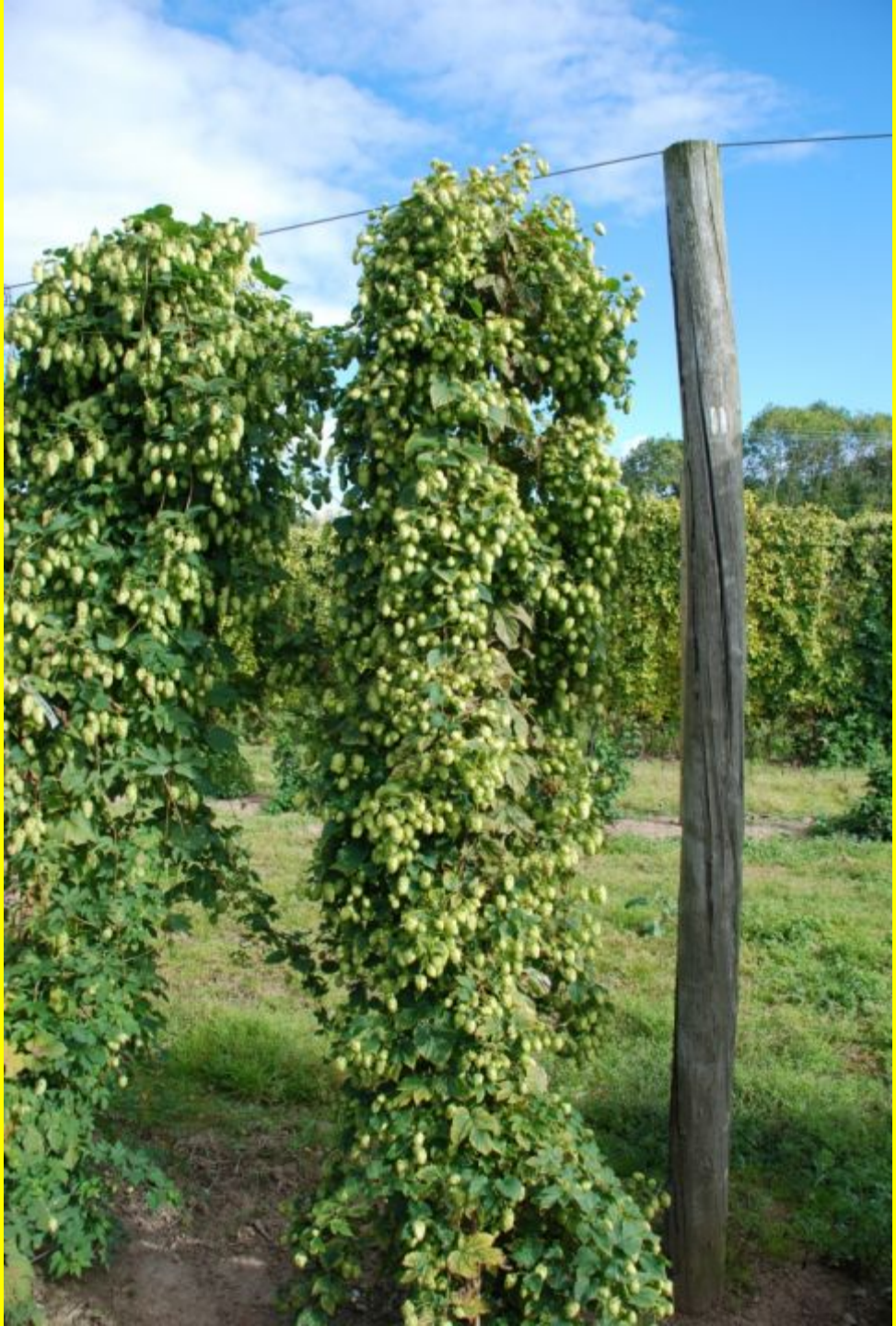
Aroma genotypes

H	Row	Field	Plant	Alpha acids (% w.w.)	Beta Acids (% hm).	Ratio Alpha/Beta	Cohumulone (% rel.)	Colupulone (% rel.)	X	DMX
18	5	1	1	4.7	4.6	*1.0*	42.5	69.7	0.41	0.08
16	2	5	6	4.1	3.3	*1.2*	26.9	46.8	0.26	0.16
18	4	5	2	6.5	4.7	*1.4*	19.3	37.5	0.28	0.10
N25	ANK1109			5.2	3.7	*1.4*	22.4	40.1	0.31	0.11
18	3	7	11	6.1	4.2	*1.4*	16.7	37.5	0.26	0.13
16	9	7	8	4.4	3.0	*1.5*	22.9	41.1	0.25	0.09
18	6	13	5	7.8	5.3	*1.5*	18.0	37.6	0.49	0.11
16	8	17	9	6.8	4.5	*1.5*	24.4	44.3	0.31	0.18
16	14	2	3	3.5	2.3	*1.5*	23.9	40.4	0.23	0.10

Business trips to England

Hop crossing – new progenies

Assessment of perspective genotypes



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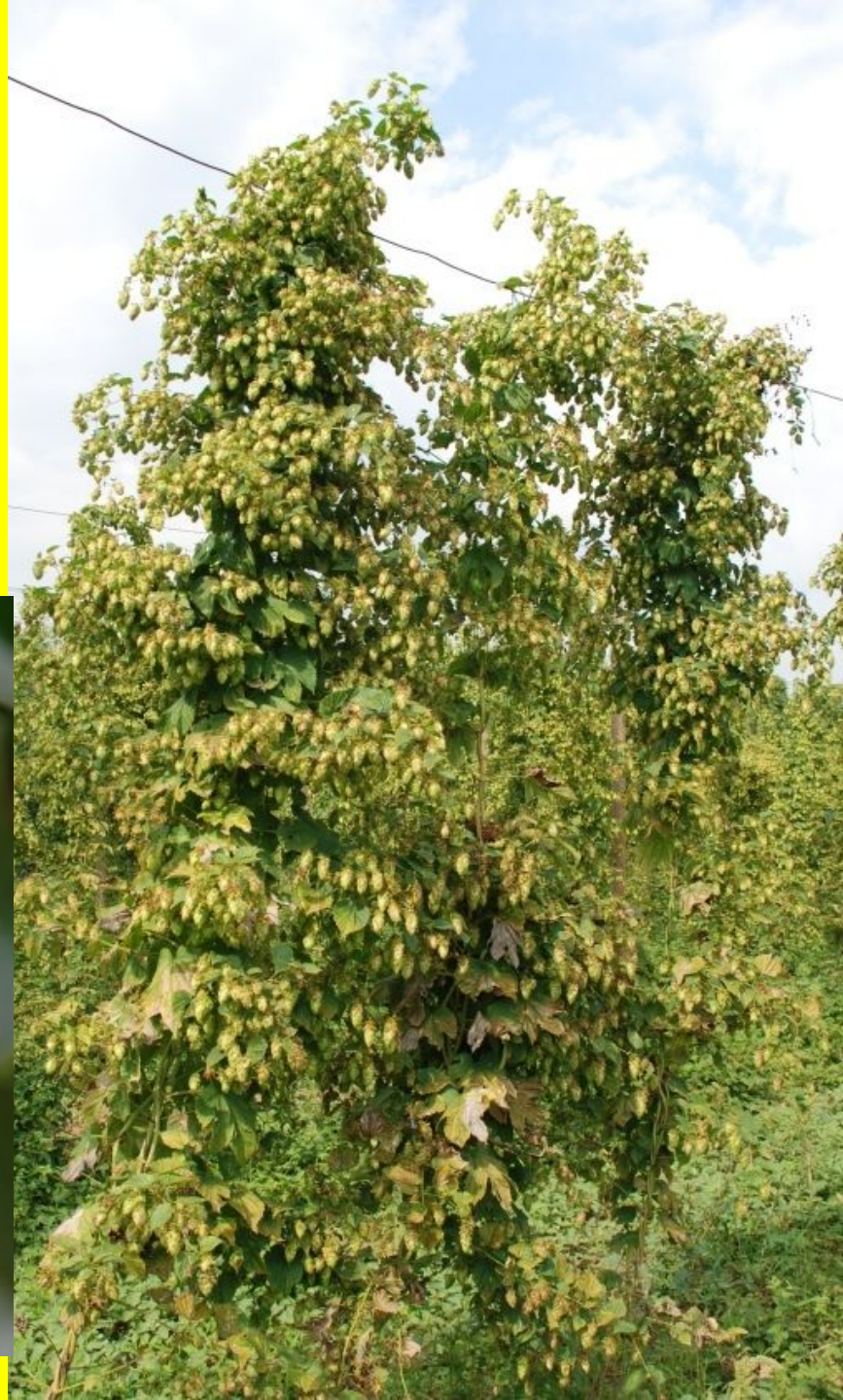
N3



N5

Results of Breeding Work

2009

2014

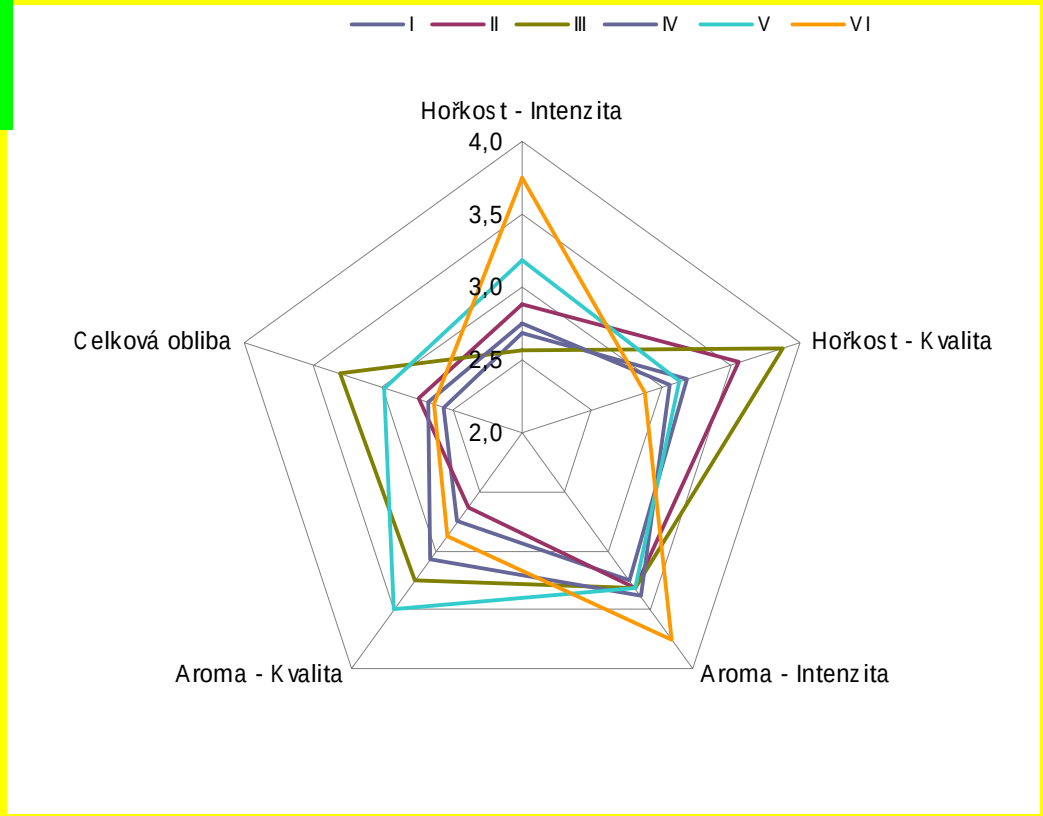
Applying for11 genotypes into registration trials

5 in 2013
6 in 2014

Brewing tests

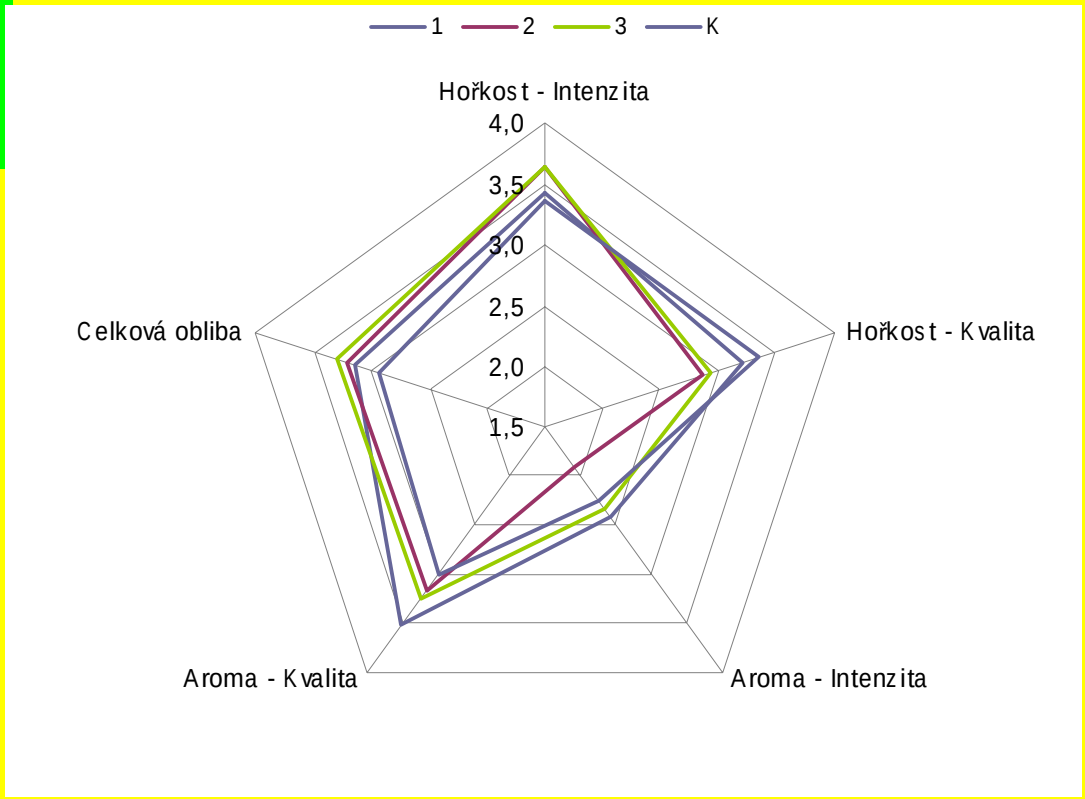
1. Series
Krušovice

1. Series	Alpha	Points	**Order**
H 15 2r 8f 1p	3.8	40	**3**
H 20 12r 11f 16p	5.1	44	**1**
SAAZER Os.cl.31	4.0	42	**2**
H 21 8r 2f 5p	8.9	28	**3**
NK R 5380	5.1	43	**2**
Rubin	11.6	46	**1**



Hops	I	II	III	IV	V	VI
Intensity of Bitterness	**2.69**	**2.88**	**2.56**	**2.75**	**3.19**	**3,75**
Quality of Bitterness	**3.19**	**3.56**	**3.88**	**3.06**	**3.13**	**2,88**
Intensity of Aroma	**3.25**	**3.31**	**3.31**	**3.38**	**3.31**	**3,75**
Quality of Aroma	**2.75**	**2,63**	**3.25**	**3.06**	**3.50**	**2,88**
Deliciousness	**2.56**	**2.75**	**3.31**	**2.69**	**3.00**	**2,63**
Order (total)	**41**	**35**	**20**	**28**	**21**	**23**
Order	**6**	**5**	**1**	**4**	**2**	**3**

2. Series
Krušovice



3. Series	Alpha	Point	Order
H 20 11r 1f 2p	4.69	66	**3**
H 21 2r 14f 15p	4.4	71	**1**
H 21 3r 7f 7 p	4.87	70	**2**
Saazer	3.98	62	**4**

Hops	1	2	3	K
Intensity of Bitterness	**3.43**	**3.64**	**3.64**	**3.36**
Quality of bitterness	**3.21**	**2.86**	**2.93**	**3.36**
Intensity of Aroma	**2,42**	**1,92**	**2,33**	**2.25**
Quality of Aroma	**3.50**	**3.17**	**3.25**	**3.00**
Deliciousness	**3.14**	**3.21**	**3.29**	**2.93**
Order (total)	**18**	**17**	**16**	**19**
Order	**3**	**2**	**1**	**4**

3. Series
Pilsen

3. Series	Alpha	Points	Order
H 20 11r 1f 2p	4.69	66	**3**
H 21 2r 4f 15p	4.40	71	**1**
H 21 3r 7f 7 p	4.87	70	**2**
Saazer	3.98	62	**4**

Taste	Sample 1	Sample 2	Sample 3	Sample 4
SWEET	4.2	4.0	4.0	4.0
BITTER	5.7	5.8	6.0	6.7
BODY	5.3	5.8	5.8	5.6
ESTERY / AROMA	2.0	2.0	2.0	2.0
ASTRINGENT	3.2	3.2	3.0	2.5
CARAMEL	1.7	1.5	1.5	1.3
BURNT	1.2	1.0	1.7	1.5
MALTY	2.8	2.8	3.0	3.0
DIACETYL	1.8	1.8	2.0	2.2
HOPPY	3.7	4.3	3.5	4.5
KETTLE HOP	1.5	2.0	1.7	2.0
HOP OIL	1.3	1.8	1.3	1.8
RESINOUS		0.2		
FRESHLY CUT GRASS	0.3	1.2	0.5	0.2
STRAWLIKE	0.2	0.2	0.3	0.2
ISOVALERIC	0.3	0.2	0.2	0.3
AUTOLYSED			0.8	
SOUR	0.7	0.5	0.7	0.5
DRINKABILITY RATING	6.9	7.4	6.3	8.3

Presentation of the Results

1. IHGC Scientific Commission, Lublin, Poland 2011 – Proceedings.
2. New knowledge from genetics and breeding of agricultural crops. Piešťany, Slovakia, 2011 – Proceedings.
3. American Hop Convention 2012 – Hop Research Council – CA, USA.
4. IHGC Scientific Commission, Kiev, Ukraine, 2013 – Proceedings.
5. ISHS, Third International Humulus Symposium, Acta Horticulturae, Zatec, Czech Republic 2013 – Proceedings.
6. Publications in scientific and technical journals.
7. Workshop: „Use of new perspective hop genotypes in brewing industry.“
8. Experimental hop gardens planted with perspective genotypes.
9. Applying for registration trials – 11 genotypes – their assertion in breweries.

Practical Results after Finishing the Project

1. **Till 2018 the first Czech Dwarf Varieties (EUREKA, Saaz EUREKA) will be released** (*Plant Variety Rigths Protection*).
2. **Growing of the New Dwarf Varieties in Practice and their Use in Brewing Industry. New Types of Beer – „Eureka Lager (Ale)“**
3. **Further Cooperation with English Researchers** (*Commercialisation of Highly Aroma European hops by both the Czech Republic and the U.K. to supply brewing demand worldwide*).

Thank you for your attention!