

BARTH-HAAS HOPS ACADEMY

All there is to know about hops!



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Introduction into the world of hops

Challenges in the modern & successful
production of hops

A member of the BARTH-HAAS GROUP

Introduction

Stefan J. Stanglmair

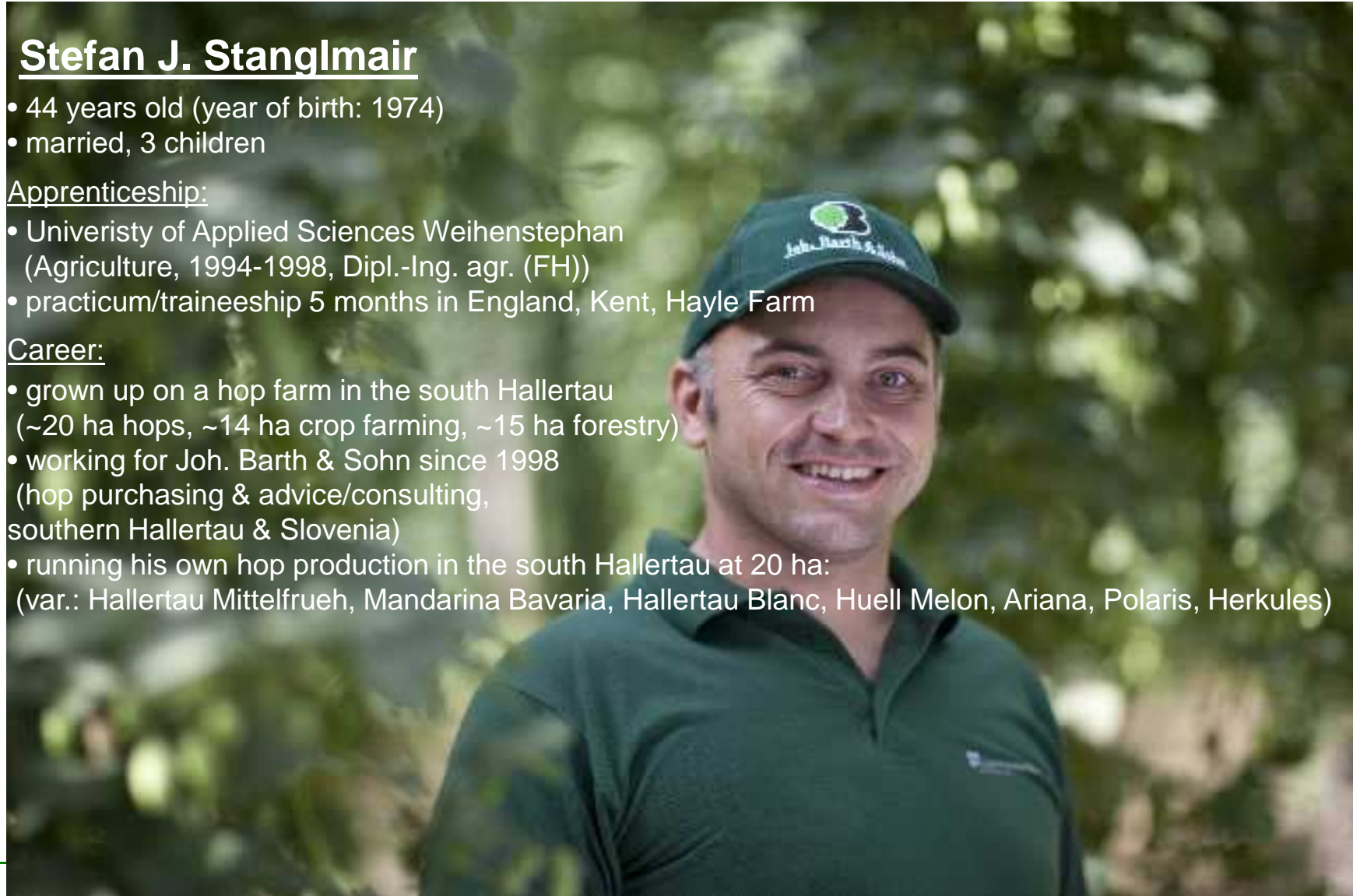
- 44 years old (year of birth: 1974)
- married, 3 children

Apprenticeship:

- University of Applied Sciences Weihenstephan (Agriculture, 1994-1998, Dipl.-Ing. agr. (FH))
- practicum/traineeship 5 months in England, Kent, Hayle Farm

Career:

- grown up on a hop farm in the south Hallertau (~20 ha hops, ~14 ha crop farming, ~15 ha forestry)
- working for Joh. Barth & Sohn since 1998 (hop purchasing & advice/consulting, southern Hallertau & Slovenia)
- running his own hop production in the south Hallertau at 20 ha: (var.: Hallertau Mittelfrueh, Mandarin Bavaria, Hallertau Blanc, Huell Melon, Ariana, Polaris, Herkules)



Agenda (second part)

Challenges in the modern & successful production of hops (40 min)

- Hop cultivation systems
- Measures to adjust varieties into different growing regions/climates
- Up to date Irrigation & fertigation
- Digitalisation in hop production
- Contemporary plant protection in hops
- Contemporary harvesting/kilning/drying of hops
- Up to date conditioning of hops
- Modern documentation and certification in hop production
- Production measures to reach highest quality in hops

Hop cultivation systems

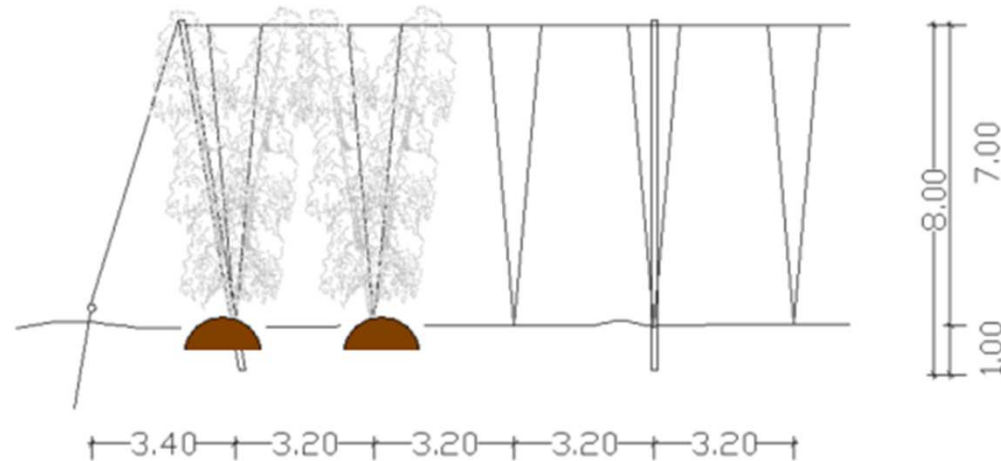
High Trellis Hop Garden - double bine



Bild: LfL

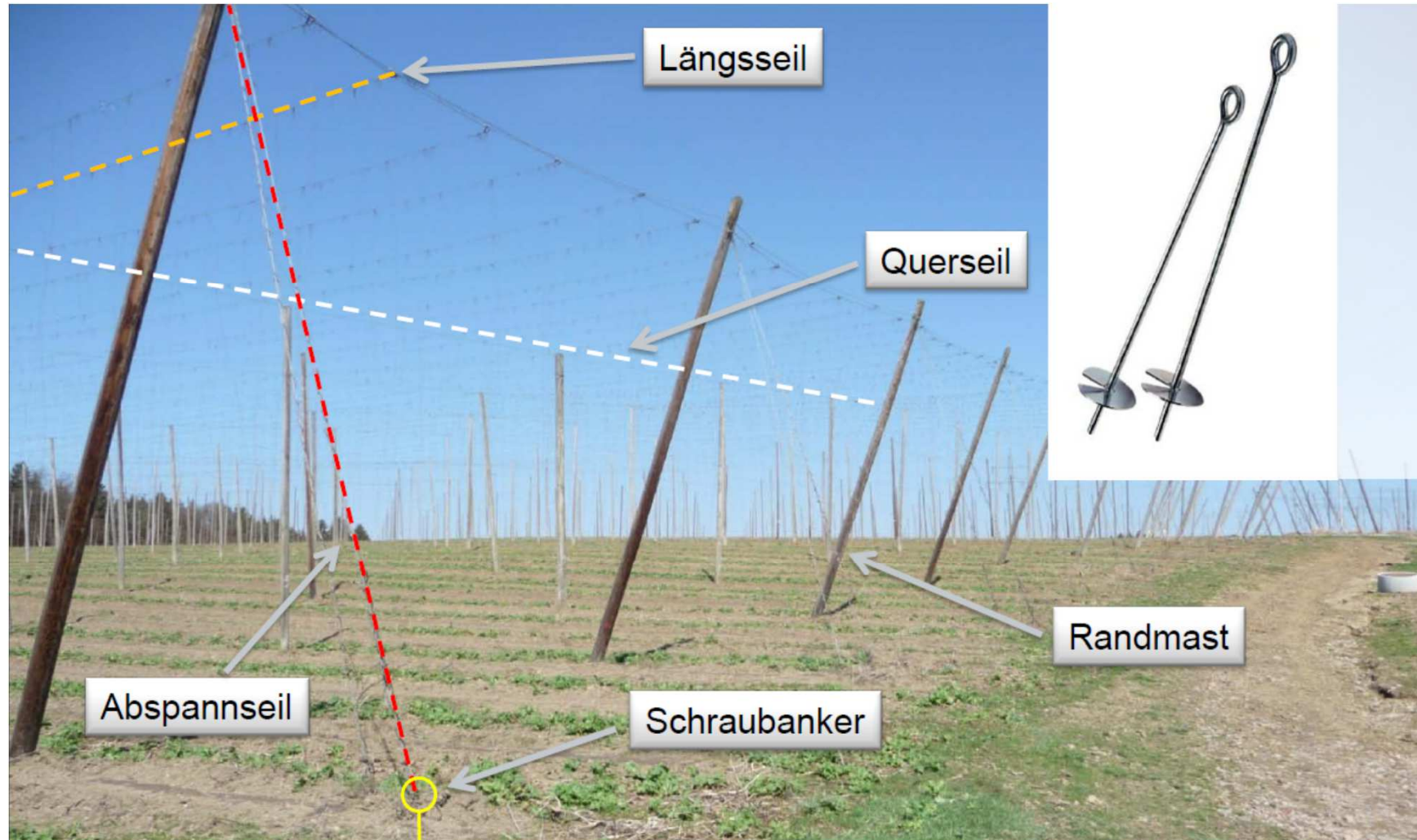
Hop cultivation systems

Querschnitt -Hallertauer Gerüstanlage-



- Hallertau Hop Trellis
- spacing in the row: 1,3 – 1,7 m
- row distance: 3,2 m
- Hight: 7 m

Hop cultivation systems



Quelle: Statik von Hopfengerüstanlagen, Hochschule Regensburg

Hop cultivation systems

Low Trellis System

- spacing in the row: 0,75 m
- distance row to row: 3,2 m
- Hight: 3,0 m



Hop cultivation systems

- Most of the hops commercially grown are at High Trellis
- Some hop production at Low Trellis in England and USA

Advantage of Low Trellis	Disadvantage of Low Trellis
Reduced demand of chemical agents	Only very few suitable varieties
Reduced drift with special spray equipment	low yields
Reduced demand on labour and energy	Low stability against wind

Digitalisation in hop production – new way of erecting a hop field

GPS mapping of hop gardens

- CAD-Planing of hop gardens
- Straight to the point GPS-mapping in the field
- Planting rows per GPS
- Mapping of hop poles per GPS
- Mapping roboter with hole driller



Irrigation control technology

- Computer control system for irrigation control
- Frequency transforming technology to control the pressure and water flow/ water quantity from the deep-well pump
- => Increase of the energy-efficiency



Irrigation control technology



- Frequency transforming technology to control the pressure and water flow/ water quantity from the deep-well pump

Drip Irrigation – different methods to position

Different methods of positioning

A: on top of the Hill Row



B: underground near the Hill Row



C: on top of Trellis above the Hill Row



Drip Irrigation – different methods to position

Different methods of positioning the drip irrigation tubes

A: on top of the Hill Row	B: underground near the Hill Row (sub surface drip irrigation)	C: on top of Trellis above the Hill Row
~ 50 % in Germany, appr. 1.500 ha	~ 45 % in Germany, appr. 1.400 ha	~ 5 % in Germany, appr. 150 ha
<p>+</p> <ul style="list-style-type: none"> • Perfect functional control • Best way of irrigation for light & sandy soils • Best performance in hops 	<p>+</p> <ul style="list-style-type: none"> • Low annual amount of labor • Irrigation is timewise indefinitely possible • No damage through rodents 	<p>+</p> <ul style="list-style-type: none"> • Low annual amount of labor • Irrigation is timewise indefinitely possible • No damage through rodents • Humid micro climate in the hop garden • No damage through soil cultivation
<p>-</p> <ul style="list-style-type: none"> • Highest annual amount of work/labour • Irrigation start not possible before mid of June • Damage through rodents possible 	<p>-</p> <ul style="list-style-type: none"> • complicated functional control • Soil compaction at the tractor lanes • Damage through soil cultivation possible 	<p>-</p> <ul style="list-style-type: none"> • Higher effort of installation • complicated functional control • Micro erosion, slurry soil coating, wind drift • Leaf & Bloom combustion through fertigation • Inhomogenous constituent climate – increase/support of fungal diseases

Fertigation = Fertilization through Drip Irrigation

- **Fertigation is necessary to avoid undernutrition through irrigation!**

Example:

- **June: irrigation + fertigation accentuated on nitrogen**
 - Daily appr. 1,5 mm (15 m³/ha) water + 2 kg Urea (46%) + 5 kg MgSO₄
- **July: irrigation + fertigation balanced between nitrogen & magnesium**
 - Daily appr. 2 mm (20 m³/ha) water + 2 kg Urea (46%) + 6 kg MgSO₄
- **August: irrigation + fertigation accentuated on magnesium**
 - Daily appr. 2 mm (20 m³/ha) water + 1/2 kg Urea (46%) + 4 kg MgSO₄



Sensor spray technology in single plant protection

Sensorcontrolled single plant control technology

- Exact & accurate plant protection
- Saving chemical agents

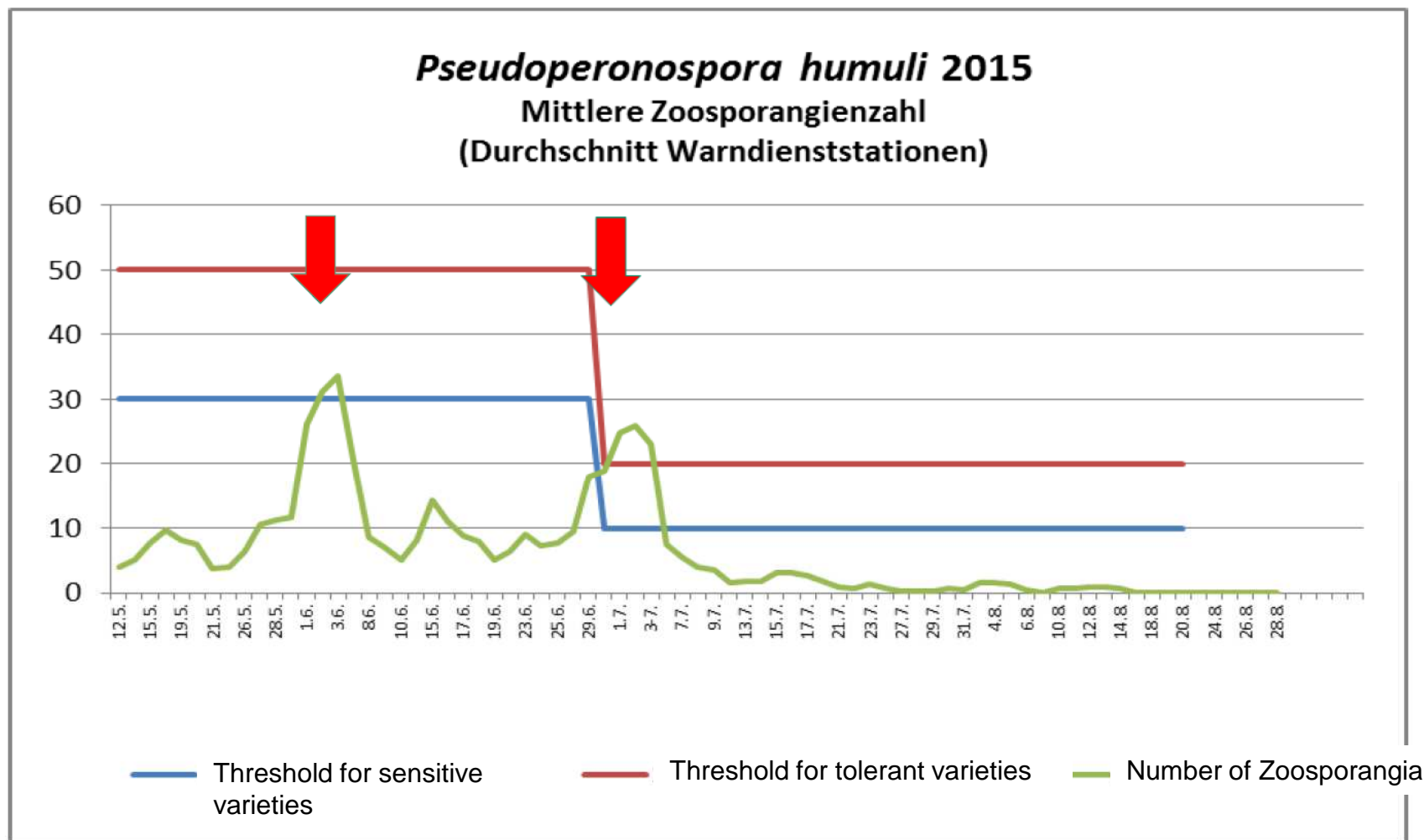


System: SprayControl or SprayDos



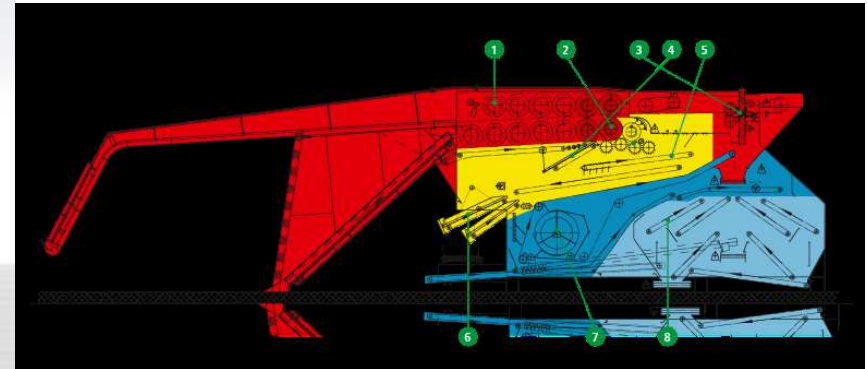
- Automatic control of the amount of plant protection solution at varying driving speed
- Electronic display of driving speed and amount of plant protection solution l/min or l/ha

Pseudoperonospora – warning service



Digitalisation in hop production

Frequenzy transforming technology in picking machines

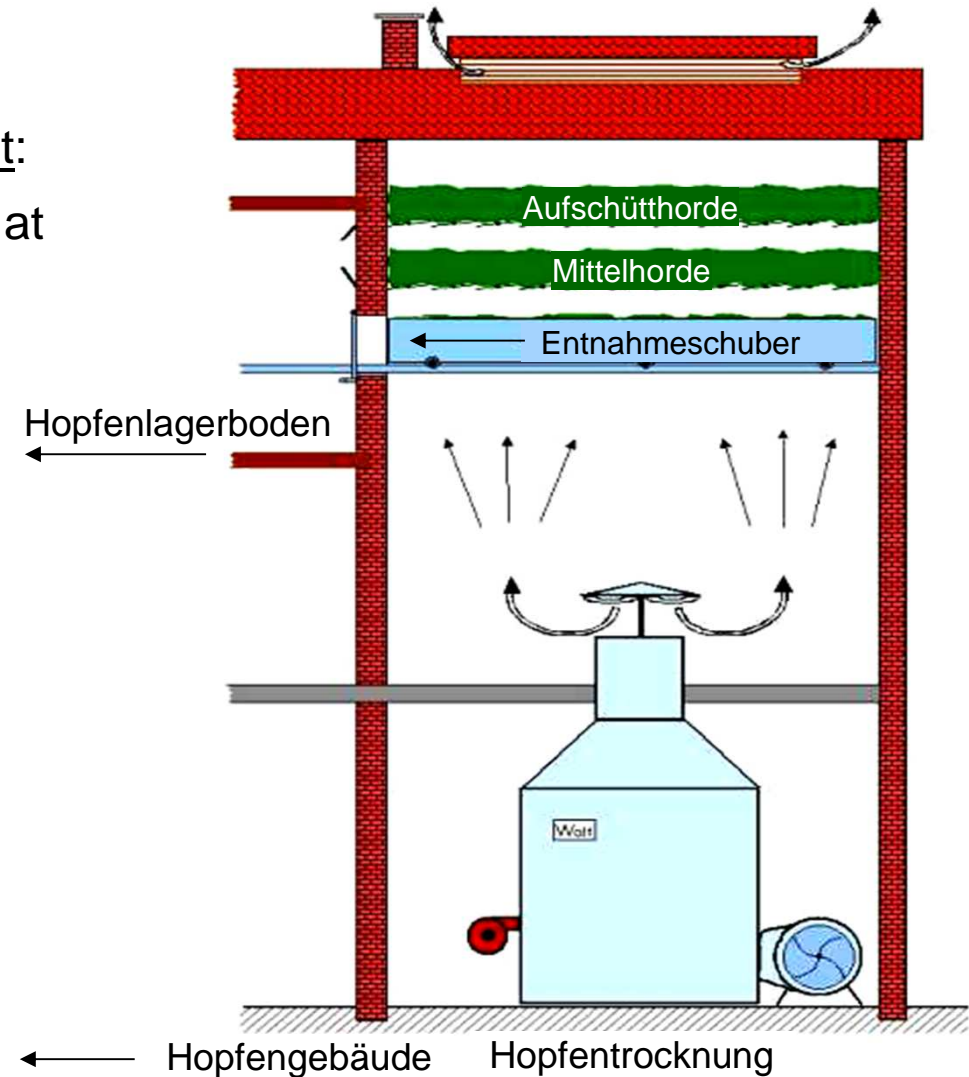


- Optimization of the picking process
- Fine tuning possibilities of different electric motors
- More gentle start of the electric motors to avoid „start up peaks“
- Up to 30 % energy savings
- Reduction of motor noise
- Extension of lifespan of the electric motors
- **youtube:** <https://www.youtube.com/watch?v=MnmePLAx9YU>

Kilning/Drying of Hops

Multiple layer kiln for hops

- Principle of kilning hops gently & efficient:
 - **Homogeniuos hight and density** at the top layer!
 - Drying temperature:
62 – 65 °C
 - airspeed:
0,3 – 0,4 m/s
 - Hight of hops at the top layer:
30 – 35 cm



Digitalisation in hop production

Frequenzy transforming technology in hop drying equipment



- Progressive adjustment of the volumetric flow rate and adjustment of the power
- More gentle start of the electric motors to avoid „start up peaks“
- Frequenzy transforming technology in hop drying equipment is necessary for the so called: „hop drying in three phases“
- **youtube:** https://www.youtube.com/watch?v=_4ywsUq2vaU

Computer control system for hop drying



„Three-phases-kilning“ for hops

- Fullautomated adjustment of drying parameters of hops during the whole drying process
- Quality conservation due to optimization of the drying phases
- Energy safing
- Increasing of the drying capacity due to optimization of the water output from the hops **youtube:** <https://www.youtube.com/watch?v=rVfrkX496Fk>

Digitalisation in hop production

Automatic kiln filling system

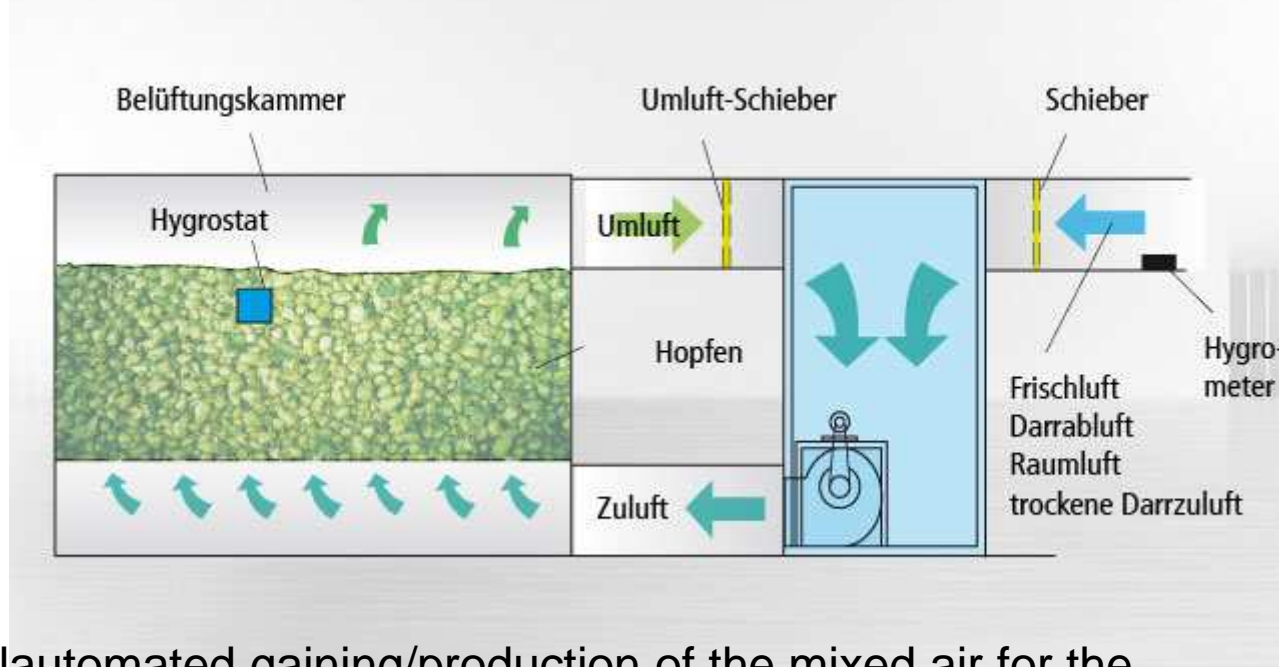


Fullautomated, sensorcontrolled filling system for hop kilns

- Rapid and fast filling
- Homogenous filling
- Increase of the drying capacity due to reduction of the filling time
- More gently kilning process through uninterrupted in the drying procedure
- **youtube:** <https://www.youtube.com/watch?v=I7BWDn5alvE>

Digitalisation in hop production

Computer controlling system conditioning (climabox)



- Fullautomated gaining/production of the mixed air for the conditioning of the hops
- Optimization of the moisture content of the hops

Parameters of the **intake air** for perfect conditioning of hops:

- **appr. 22°C,**
- **63% rel. air humidity**



Conditioning of hops

- Conditioning of hops is essential for preserving the quality of hops and establishing the storability



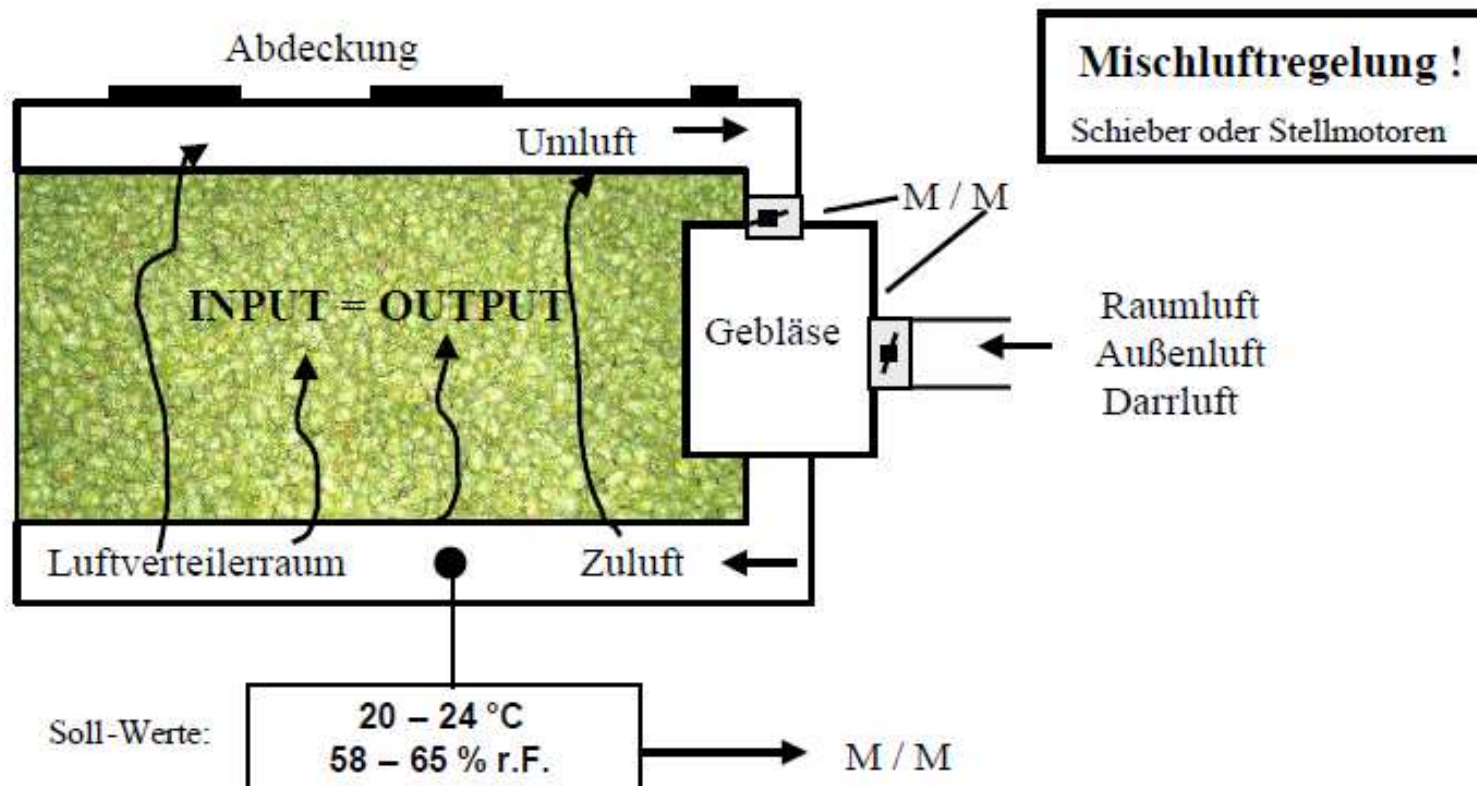
- Optimum water content after cilning/drying:
9 – 10 %

BUT:

- Water content of the Spindle:
15 %
- Water content of the cone pedals:
7 %
- Inhomogenity during the drying process, because of indifferent cone sizes
- **Conditioning Procedure = Distribution of different moisture contents**
 - Flat storaging on a floor (hop floor)
 - Conditioning in a conditioning champer

Conditioning of hops

- Scheme of conditioning of hops in conditioning cambers



Digitalisation in hop production – Ensuring Traceability & product safety

Computer documentation software

- Extensive documentation of measures of plant protection in hops
- Transmission of the plant protection documentation into CoHaP
- **HR-CoHaP:** Hop-weight-software of the Hopfenring (HR)



Digitalisation in hop production – Ensuring Traceability & product safety

Data flow: hop grower → Hopfenring → JBS

Extensive Documentation of measures of plant protection in hops via **HR Doku App** for every single hop field



dataflow

Transmission of the plant protection documentation into **HR-CoHap** (hop-weighting software of the Hopfenring (HR)) for every single lot of hops



dataflow

Transmission of the weightlist, field datas, harvesting datas, drying datas, plant-protection-documentation per each single lot of hops into the **ERP system (Navision)** of Joh.Barth&Sohn



Adjusting varieties to different growing regions/climates through cutting of the hops

Sense and purpose of the cutting/puning of the hops:

- **Most important: steering of the budding => steering of the growth => aim: end of vegetative growth (Stadium 39) should be between mid June and begin of July – start of blooming should be not before end of June!!! → very important to adjust foreign varieties to another growing region!!!**
- control of pests and diseases: (high number of Peronospora spores in the top sprouts, which will be removed mechanically through the cutting!)
- rejuvenation of the plant (stimulation of the plant through the cutting, stimulation of regeneration and growth)
- mechanical control of weeds (wintergreening/weeds on the hill row will be removed mechanically and tilled into the soil)
- isolation of cuttings for baby plant production

Adjusting varieties to different growing regions/climates through cutting of the hops

Discussion of height of cutting and time of cutting of the individual varieties:

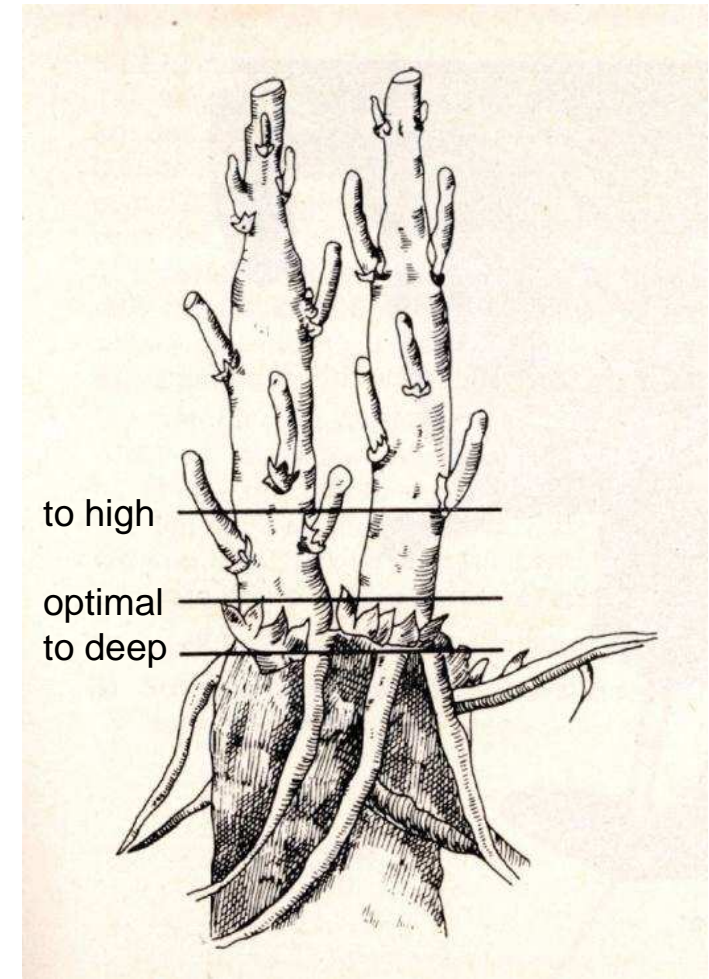
Important: The cutting surface should be smooth, sleek, even and plain to improve the wound closure!

Cutting to high:

- plant gradually gets over time upwards
- Vitality and yield decrease gradually time by time

Cutting to deep (cut into the heart/death cut):

- insufficient, poorly and uneven sprouting
- decreased growth
- reduced yield



Bilder: LfL

Adjusting varieties to different growing regions/climates through cutting of the hops

Discussion of the timing of the cutting of the individual varieties:

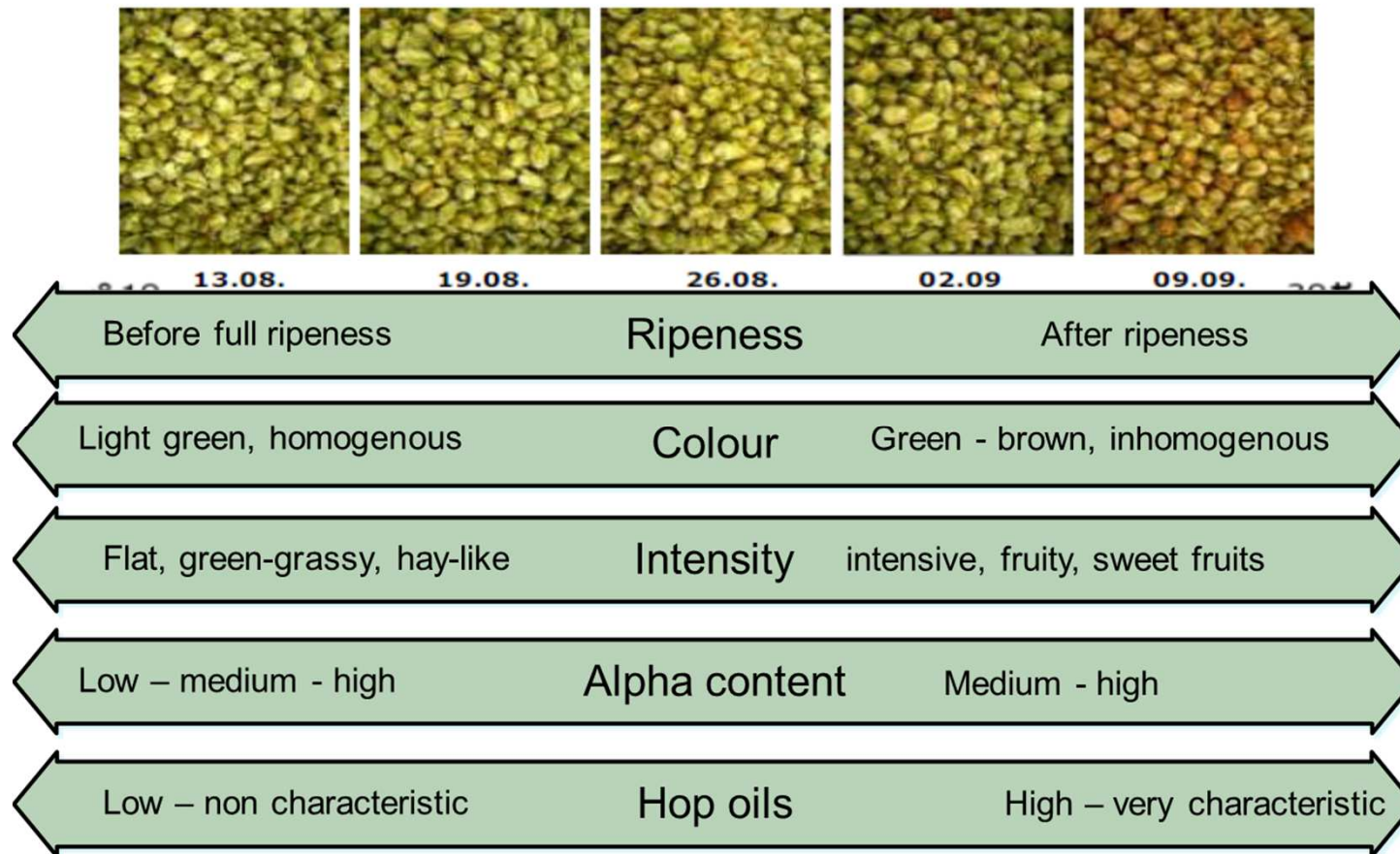
cutting time			
til mid march	end of march	end of march til start of april	start of april til mid of april
Hall. Tradition	Amarillo	Callista	Saazer
Hall. Taurus	Ariana	Hallertau Blanc	Spalter
Northern Brewer	Brewers Gold	Hallertauer Mfr.	Tettnanger
Opal	Cascade	Nugget	
Perle	Hall. Magnum	Spalter Select	
Polaris	Herkules		
Saphir	Hersbrucker Spät		
	Huell Melon		
	Mandarina Bavaria		
	Smaragd		

- these above mentioned dates are true for the Hallertau climate
- cutting needs to be adjusted for different climates, eg.
 - North Italy: cutting delay of 10 – 14 days compared to the Hallertau cutting dates,
 - North Germany: cutting about 3 – 5 days earlier compared to the Hallertau

cutting dates

Factors influencing the hop quality severe

➤ Example: Ripeness/Maturity – Time of harvest



The challenge is to find the right date of harvest to ensure acceptable optical quality combined with highest yield and brewing value!!!

PRO:

- **Revenue** - potentially high yield & gain per acreage
- **Regionality** – production of hops close by the brewery/consumers
- **Jobs** – preservation of jobs in the region
- **Diversification** – horizontal diversification of farms (increasing chances, decreasing the risks)

CON:

- **Risk** - potentially high risks (market risk, quality risk, financial risk, ...)
- **Know How** – only highest quality is accepted at the market
- **Jobs** – high labour demand in hop production
- **Investment** – extremely high investments (trellis, planting, special machinery like harvesting/picking/drying/conditioning/baling equipment ...) has to be done to
- **Infrastructure** – infrastructure of **hop production & hop processing** is only available in the large hop growing regions
- **Climate** – climatic risks
- **Varieties** – several varieties are proprietary and protected not to grow them everywhere

Zur Person

Stefan Stanglmair

- 44 Jahre alt (Jahrgang: 1974)
- verheiratet, 3 Kinder

Ausbildung:

- Fachoberschule Schönbrunn, Agrarwirtschaft 1991-93
- University of Applied Sciences Weihenstephan (FH Weihenstephan, Land- und Ernährungswirtschaft 1994-98, Dipl.-Ing. agr. (FH))
- Praktikum 5 Monate in Kent, GB, (Hayle Farm)

Laufbahn:

- aufgewachsen auf einem Hopfenbaubetrieb in der südlichen Hallertau (~20 ha Hopfen, ~14 ha Marktfrucht, ~15 ha Wald)
- seit 1998 bei Joh. Barth & Sohn (Hopfeneinkauf & Beratung, südliche Hallertau & Slowenien)
- Betreiber einer eigenen Hopfenproduktion im Süden der Hallertau auf 20 ha: (Sorten: Hallertau Mittelfrueh, Mandarin Bavaria, Hallertau Blanc, Huell Melon, Ariana, Polaris, Herkules)



Thank you for your attention

www.HopsAcademy.com
www.BarthHaasGroup.com