Fertigation as an intensification tool of hop production

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Abstract
The fertigation (water + water soluble fertilizers) can increase a hop yield.

Key words. Hop. Fertigation. Drip irrigation.

Introduction

The usual way of mineral nutrition of czech hops consists of application of industrial mineral fertilizers in autumn or early spring around the time of prunning. It is followed by application of nitrate forms of nitrogen-based mineral fertilizers right before first hill-building ploughing. There is optional third fertilization (usually nitrate nitrogen only) before second hilling, but it is based on leaf analysis and is not practiced every year. Foliar application of micronutrients (also based on leaf analysis) together with plant protection products also occurs during vegetation. This way of fertilization is used on farms without drip irrigation.

The drip irrigation provides (beside watering) distribution of water-soluble fertilizers. We changed the approach to hop nutrition in 2017 and 2018. The basic dose of fertilizers was applied during sprouting, followed by quintuple fertigation and foliar application during vegetation period. The hop gardens were irrigated as required.

Material and methods

Locality – hop growing area Saaz, variety Saaz, planted in 2004, V-shape training, spacing 300 cm x 100 cm (distance between rows x plants).

Standard treatment

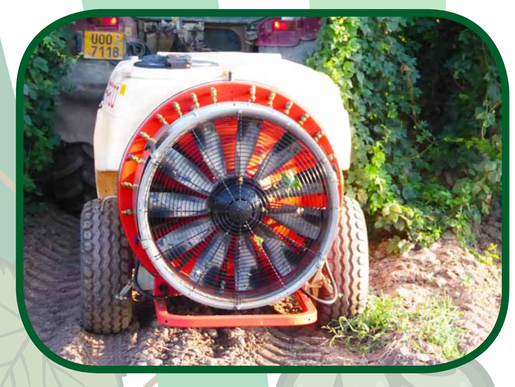
BBCH 01	March	ammonium sulfate (26 % N; 13 % S)	300 kg/ha	mounted spreader
		ammonium phosphate (11 % N; 52 % P_2O_5)	300 kg/ha	
		potassium chloride (60 % K_2O)	300 kg/ha	
BBCH 31-35	May	ammonium nitrate with limestone (27 % N)	250 kg/ha	mounted spreader
BBCH 34	May	zinc (700 g/l)	0.5 l/ha	spraying machine
		magnesium sulfate (15 % MgO)	5 kg/ha	spraying machine
BBCH 36-38	June	zinc (700 g/l)	0.5 l/ha	spraying machine
		magnesium sulfate (15 % MgO)	5.0 kg/ha	spraying machine
		leaf fertilizer ‚Vegaflor' (6 % N; 5,7 % P_2O_5; 6 % K_2O)	10.0 l/ha	spraying machine
BBCH 51 & 55	July	leaf fertilizer ‚Vegaflor'	10.0 l/ha	spraying machine
BBCH 63-67	July	leaf fertilizer ‚Vegaflor'	10.0 l/ha	spraying machine

Trial variant

BBCH 09 & 11	April	YaraMila NPK (20 % N; 7 % P_2O_5; 10 % K_2O; 4 % S; 2 % MgO)	640 kg/ha	row spreading
BBCH 35	June	YaraTera Kristalon Super (12 % N; 12 % P_2O_5, 36 % K_2O; + micro)	42.5 kg/ha	fertigation I
BBCH 35	June	leaf fertilizer ‚YaraVita Zeatrel' (29,5 % P_2O_5; 5 % K_2O; 4,5 % MgO; 3,1 % Zn)	3.0 l/ha	spraying machine
		leaf fertilizer ‚Bortrac' (10,95 % B; 150 g/l)	1.0 l/ha	spraying machine
BBCH 36	June	YaraTera Kristalon Super	42.5 kg/ha	fertigation II
BBCH 37	June	YaraVita Zintrac 700 (40 % Zn; 700 g/l)	0.5 l/ha	spraying machine
BBCH 39	June	leaf fertilizer ‚YaraVita Zeatrel'	3.0 l/ha	spraying machine
		leaf fertilizer ‚Bortrac'	1.0 l/ha	spraying machine
BBCH 39	June	YaraTera Kristalon Super	42.5 kg/ha	fertigation III
BBCH 51 & 55	June	YaraTera Kristalon Super	42.5 kg/ha	fertigation IV
BBCH 63	July	YaraTera Kristalon Super	42.5 kg/ha	fertigation V
BBCH 65-69 & 71	July	YaraVita Thiotrac 300 (15,2 % N; 22,8 % S; 300 g S/l)	5.0 l/ha	spraying machine

BBCH 01 (Dormancy: rootstock without shoots (cut))

A mounted spreader



A spraying machine

A drip irrigation

Spraying of leaf fertilizers

BBCH 09 (Emergence: first shoots emerge at the soil surface)

A trial device for fertigation

Results

This experiment with fertigation led to yield increase by 27 % in 2017 and 33 % in 2018 compared to control. Alpha-acids content remained unaffected in 2017, it decreased by 3 % (statistically not significant). On the other hand, it increased by 14 % in 2018 (statistically significant).

Harvest: hop bines were harvested manually

Weighting and sampling at the hop picking machine

Packaging of hop samples after drying

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