

PRESENT SITUATION IN HUNGARIAN SUGARBEET PRODUCTION

LASZLO POTYONDI AND JANOS KIMMEL

BETA-KUTATÓ és FEJLESZTŐ Kft.

ABSTRACT

Presently in Hungary sugar beet is produced on 55-60 thousand hectares of 6 sugar factories owned by three sugar companies. After the expected EU accession in 2004 we will be allowed to produce our sugar quota of approximately 400,000 t on an area of similar magnitude. It is guaranteed by the right to deliver 2.5 million t sugar beet in total that was granted to producers in 2002.

We are going to describe the current level of sugar beet production by providing an overview of the major technological elements, with special emphasis on the Hungarian ecological conditions as well as pathogens and pests.

In Hungary the most important decisive factor of sugar beet production is the amount and distribution of rainfall. More than half of the last 10 years was droughty, however we have only been able to irrigate maximum 20% of the crop.

The most important pests are weevils (*Curculionidae*), beet flea (*Chaetochnema tibialis* Marsh), aphids (*Aphis fabae* Scopoli), a beet moth (*Scrobipalpa ocellatella* Boyd), the cutworms of moths (*Noctuidae*) and of rodents vole (*Microtus arvalis levis*) and hamster (*Cricetus cricetus* L.). The most important diseases are rhizomania (BNYVV), a cercospora leaf spot (*Cercospora beticola* Sacc.) and Powdery mildew (*Erysiphe betae* (Vahna) Weltzein). We have efficient protection methods against most of the pests and diseases.

ABRÉGÉ

Dans l'organisation des 6 sucreries appartenant aux trois groupes sucriers, actuellement en Hongrie il existent des cultures de betteraves sur une surface totale de 55~60 milles ha. A compter de 2004 après que la Hongrie obtiendra la qualité de pays membre de l'Union Européenne, on aura besoin environ de la même surface pour produire les betteraves nécessaires pour la fabrication de notre quota de sucre d'à peu près de 400.000 to. Cela sera assuré par un droit de livraison de betteraves de 2,5 millions to. distribué entre les planteurs en 2002.

Nous présentons le niveau actuel de la culture des betteraves avec la vue d'ensemble des principaux éléments de technologie agraire, en prenant surtout en considération les circonstances écologiques, les agents pathogènes, et les parasites végétales étant présents dans le pays.

En Hongrie, le facteur décisif le plus important de la culture de betteraves ets la

quantité et la distribution des précipitations. Plus que la moitié des dernières 10 années ont été caractérisées par la sécheresse et on a eu la possibilité de faire des irrigations que maximum sur 20% de la surface emblavée.

Le plus important d'entre les parasites sont celles appartenant à l'espèce des charançons (Curculionidae) les puces des betteraves (*Chaetochnema tibialis* Marsh), les pucerons noirs des feuilles de betterave (*Aphis fabae* Scopoli), les mites des betteraves (*Scrobipalpa ocellatella* Boyd), les chenilles des papillons noctéliens (Noctuidae) et d'entre les rongeurs le rat des champs (*Microtis arvalis levis* Strauss), et les hamsters (*Cricetus cricetus* L.) Les maladies les plus importantes sont la risomanie (BNYVV), l'érysiphe de feuille à cercospora (*Cercospora beticola* Sacc. et le oidium (*Erysiphae betae* (Vahna) Weltzein). Nous disposons des méthodes efficaces de lutte contre la majorité des maladies et des parasites.

KURFASSUNG

Derzeit bauen in Ungarn drei Zuckerindustrieunternehmen in ihren 6 Zuckerfabriken auf 55-60-tausend Hektar Zuckerrüben an. Auch nach der im Jahr 2004 zu erwartenden EU – Mitgliedschaft kann unsere Zuckerquote von ungefähr 400.000 t auf einem ca. so großen Gebiet produziert werden. Dies gewährleistet im Jahr 2002 das an die Erzeuger aufgeteilte Zulieferrecht von insgesamt 2,5 Millionen t Rüben.

Das derzeitige Niveau der Rübenproduktion stellen wir mit der Übersicht der wichtigsten Technologieelemente vor, unter besonderem Augenmerk auf die ökologischen Verhältnisse in Ungarn sowie auf die Krankheitserreger und Schädlinge.

In Ungarn ist der wichtigste bestimmende Faktor die Menge und Aufteilung des Niederschlags. Mehr als die Hälfte der letzten 10 Jahre waren trockene Jahrgänge, bewässern konnten wir jedoch nur auf maximal 20 % des Anbaugesbietes.

Unter den Schädlingen sind die wichtigsten die Rübenrüblerarten (Curculionidae), der Rübenerrdfloh (*Chaetochnema tibialis* Marsh), die schwarze Bohnenlaus (*Aphis fabae* Scopoli), die Rübenmotte (*Scrobipalpa ocellatella* Boyd), die Raupen der Nachteulenalter (Noctuidae) und unter den Nagern die Feldmaus (*Microtis arvalis levis*), der Hamster (*Cricetus cricetus* L.). Die wichtigsten Krankheiten sind die Rhizomanie (BNYVV), der Cercospora-Blattflecken (*Cercospora beticola* Sacc.) und der Mehltau (*Erysiphe betae* (Vahna) Weltzein.). Wir haben wirksamen Pflanzenschutzmethoden gegen die meisten Krankheiten und Schädlingen.

INTRODUCTION

Sugar beet production was started in Hungary at the end of the 18th century and growing area have varied in the course of history. Hungary's climatic conditions are suitable for producing sugar beet. The most important decisive factor of sugar beet production is the amount and distribution of rainfall. More than half of the last 10 years was droughty, however it was only possible to irrigate

maximum 20% of the crops. This is the main reason why average white sugar production in Hungary in 2002 amounted to 6.15 t/ha with a sugar beet production of 43 t/ha. Fig. 1.

GENERAL INFORMATION

Presently the six sugar factories belong to three sugar companies, having approximately equal shares of the market. For the last several years concentration of processing has become perceptible, since of the 12 factories privatised in 1989 only half of them operate today, however, the volume of sugar production is identical with the production of that time. Fig. 2. and 3. illustrates the location and capacity of Hungarian sugar factories and companies.

A process similar to the concentration of the sugar industry is also typical of sugar producers (following the breaking up after 1989). It is expected to slow down with the allocation of beet delivery right in 2002. The present situation is illustrated in Fig. 4.

Since Hungary is expected to become a member in the EU in 2004 the regulation of sugar beet production and processing will be adjusted to the EU systems. Our sugar regime has been drawn up in consideration of this fact and on 3 April 2002 sugar beet delivery rights have been allocated to 793 producers for the first time and similarly last year, on 16 December the first inter-trade agreement was made between the sugar factories and the association of sugar beet growers to regulate the following major issues:

- stipulation of beet delivery right and the detailed conditions of its distribution
- conversion of the sugar content other than 16 % into 16 %
- sugar beet purchase price
- share ratio
- intervention fund
- by-products
- condition of purchase and transportation
- terms and conditions of receiving sugar beet.

Presently in Hungary the sugar target price is 146,100 HUF/ton in 2003 the sugar beet target price is 8,800 HUF/ton with 16% sugar content. In the EU Hungary's sugar quota will be 400,454 t A and 1,230 t B, and due to the low world market price of sugar the primary aim of production will be satisfying domestic demand. The position of the Hungarian sugar market is made more difficult by the fact that isoglucose has also gained significant quotas (127,627 t A and 10,000 t B) in our country.

AGROTECHNICAL INFORMATION

Below we are describing the main characteristics of our sugar beet production on the basis of the data of the last four years. Our analyses are based on the data generated by the surveys annually conducted by BETA-KUTATÓ Kft.

The most frequent soil type of sugar beet crops are chernozem soils (72 %). About 90% of the preceding crops are traditionally corns, in more than three quarters of the cases sugar beet is sown after wheat.

Fertilizer recommendation based on soil analysis covered about 55 % of the sugar beet growing area. In most cases EUF method was used. About 30% of the fields was livestock manured and leaf fertilizers (primarily boric) were also used in the growing season in similar proportions. 15 % of the soils was limed, while 80 % got artificial fertilizer. The averages of agents applied amounted to 73 kg N, 69 kg P and 128 kg K respectively.

After harvesting the corns stubble ploughing and closing follows. This is the time to sample the soil to define nutrient levels and rhizomania contamination. Recently sub soiling has become increasingly popular as part of the autumn tillage in sugar beet production, which generally ends with deep ploughing in the autumn. As part of the spring seedbed preparation besides the traditional combinator newer machines are spreading as well (e.g. compactors).

Most of the sugar beet sowing is carried out between 1 and 20 April, mostly with a distance in row 14-18 cm and a row distance 45 cm. Germination is generally between 60-80 % in the fields and so we can reach a plant number of 70-100 thousand pro hectar. Because of its numerous advantages the application of frame lininig in sugar beet production technology is spreading in the farms as well.

Growers use pelleted seeds that are treated with insecticides and fungicides, and for the past years they have mainly chosen tolerant or resistant types.

In 86 % of the fields preemergent and 83% of the fields postemergent weed control treatments have been carried out. Mechanical cultivation can be considered widespread and hoeing is used in many places as a supplement to chemical weed control.

The most important sugarbeet weeds in hungary: China jute (ABUTH), Common couch-grass (AGRRE), Redroot pigweed (AMARE), Ragweed (AMBEL), Fat-hen (CHEAL), Creeping thistle (CIRAR), Cockspur grass (ECHCG), Annual mercury (MERAN), Pale persicaria (POLLA) and Rough cocklebur (XANST).

The following herbicides are most frequently used for basic treatment: S-metolaklór, kloridazon, metamitron, dimethenamid, cikloát, lenacil

The most frequently used herbicid aktiv ingredients in post treatment: Fenmedifám, dezmedifám, etofumezát, kloridazon, quinmerak, trifluszulfuron-metil, metamitron, klopivalid, cikloksidim, fluzifop-P-butyl, haloxifop-R-metil-eszter, kletodim, propaquizafop, quizalofop-P-etil.

Despite the droughty weather conditions of the recent years only maximum 20% of the crop was irrigated due to the lack of irrigation facilities and economic considerations.

Sugar beet harvest and processing usually starts everywhere by the end of September and lasts for approximately 2.5 months. As a result of the developments partly supported by the factories, about 60% of the crop is harvested by 6 row self-propelled tanker harvesters (Holmer, Ropa, etc.). In many places cleaner and loader and cleaner machines are used at the field depots.

DISEASE CONTROL

Of viruses rhizomania that is beet necrotic yellow vein virus (BNYVV), which appears in every sugar beet producing region of the country, is the most dangerous one, although sporadically blight and mosaic viruses spread by aphides might also appear. Currently we can successfully protect sugar beet against rhizomania with tolerant species (which have large yields among uninfected conditions as well). Since in Europe a new, more aggressive type P of the disease has been identified in two places and currently we are growing rhizomania tolerant varieties on more than 75% (Fig. 5.) we are monitoring the appearance of possible new types by means of a PCR based monitoring system.

We have recently identified the symptoms of the Low sugar syndrome in Hungary as well, however, to date we have not succeeded in identifying the pathogen (Phytoplasma or BLO) or its transmitter vector.

Of fungal diseases cercospora leaf spot (*Cercospora beticola* Sacc.) causes the biggest damage (Fig. 6.), because in a year favourable for it (warm and wet weather) it is able to cause as much damage as 20%-40%. It is especially dangerous in areas where sugar beet is infected with rhizomania as well. Here, due to the dual effect of the two diseases yield may dramatically decrease.

We are protecting sugar beet by using species resistant to the disease, and with fungicide treatment 1-3 times. A cercospora forecasting system helps define the time of protection accurately. Earlier the application of carbendazim was a major protection method, but resistant strains have developed, and today they use insecticides and their combinations belonging to the class of active ingredients such as triazol, fentin-hidroxid, morfolin and strobilurin. Fig. 7.

The other important fungal infection is powdery mildew (*Erysiphe betae* (Vahna) Weltzein), which causes problems especially in the dry years, its damage can be the same extent as that of cercospora leaf spot.

Resistant species play a minor role in protection. Most of the fungicides applicable against cercospora leaf spot are effective, and protection is generally preventive and can be carried out at the same time against both diseases.

Black leg, which can be caused by numerous pathogen phyla, summer root rot caused by various pathogens (*Thanatephorus cucumeris* (FRANK) DONK - *Rhizoctona solani* Kühn., *Macrophomina phaseolina* (Tassi) GOIDANICH) *Sclerotium bataticola* TAUBENHAUS), bacterial leaf spot (*Pseudomonas syringae* van Hall. Pt. Aptata), ramularia leaf spot (*Ramularia beticola* Fautr. & Lamb.), rust (*Uromyces betae* Lev.), phoma leaf spot (*Phoma betae* Frank), downy mildew (*Peronospora schachtii* Fuckel), and *Alternaria* leaf spot (*Alternaria alternata*) also causes local damage.

We protect sugar beet against black leg by seed treatment with thirám + himexazol, against summer root rot by using resistant species (these species are spreading nowadays), while against the other diseases we use spraying as described in the case of cercospora leaf spot.

PEST CONTROL

The most important pests (Fig. 8.) are the following:

Of weevils (Curculionidae) most economic damage is caused by brown leaf-eating weevils, which attack sugar beet after germination in its seed-leaf phase, and if their number is high (0.5-1 pcs/m² or higher) they may thin sugar beet so much that it must be resown. If the weevils attack later, in the 2-4 leaf phase of the sugar beet, it might recover from the damage, but its growth will be arrested.

Farmers make use of all types of protection methods, they kill these pests by seed treatment, soil disinfection and repeated spraying.

Beet fleas (*Chaetochnema tibialis* Marsh) cause damage to an extent similar to that of the weevils. It is especially dangerous when they attack sugar beet still under the soil surface, while it is emerging. Protection is similar to the one against weevils.

Black bean aphid (*Aphis fabae* Scopoli) are the most important ones among the aphids living on sugar beet in Hungary. Seed-treatment and soil disinfection is not sufficient against these pests either, often spraying becomes necessary as well.

Beet moths (*Scrobipalpa ocellatella* Boyd) have 3-4 generations under Hungarian circumstances and their damage occurs in sustained droughty periods.

We are only able to protect sugar beet from them with low effectiveness because of their hidden life-style.

The cutworms of moths (Noctuidae) can cause significant damages as well. They have several species, both on ground-level [turnip moth (*Agrotis segetum*) etc.] and on the foliage level [silver y moth (*Autographa gamma*), cabbage moth (*Mamestra brassicae*) stb.]. We can protect sugar beet against them by spraying with good efficiency.

Of rodents, voles (*Microtis arvalis levis*) and hamsters (*Cricetus cricetus* L.) cause vast damages. Protection methods against them are available albeit often misused.

By today the mechanical and agrotechnical methods of protection has been pushed to the background, producers primarily apply the following chemicals (Fig. 8.) and methods:

seed treatment - systemic and contact insecticides are put in the coat, every seed is treated by seed companies, (carbofuran > 95%, [imidaklopid, teflutrin, tiametoxam] <5%).

soil disinfection - distributed over the whole area by fertilizer spreader, thick-row drills, or spread on the soil by sprayers then worked in – this is no longer frequent.

- in rows using granule dispensers or peristaltic pumps at the time of sowing in 50-50% (terbufosz, karboszulfán, karbofurán, klórpírifosz, forát, teflutrin).

spraying - with insecticides with active ingredients like karbofurán, karboszulfán, diazinon, terbufosz, imidaklopid, ; tiametoxam, acetamiprid, fipronil, forát, endoszulfán, monoktotofosz, etc.