DOWNLOAD PDF SUGAR BEET CULTIVATION

Chapter 1 : Sugar - Wikipedia

Most sugar beet cultivation occurs in the European Union, the United States and Russia. The United States harvests over one million acres of growing sugar beets and we use it all, only the E.U. and Ukraine are significant exporters of sugar from beets.

Request Report Methodology Sugar beet is a root vegetable generally used to produce sugar. Being rich in nutrients and low in fat and calories, sugar beet is used in low calorie and reduced fat diet. Companies involved in the production of sugar using sugar beet are also using sugar beet by-product known as dried beet pulp which is left when sugar is extracted from the sliced sugar beet. This by-product is being provided in many forms such as molasses dried, pelleted, and plain dried. Manufacturers are supplying this by-product as a livestock feed. Meanwhile, beet molasses is being used for producing chemicals, yeast, and pharmaceuticals. European Food Safety Authority EFSA recently cleared genetically modified sugar beet to be used in food, processing, feed imports, and for food containing ingredients produced from it. Although, it has not been authorized for cultivation within the EU. GM sugar beet is also being considered for biofuel production. Meanwhile, regulatory agencies across the world have also concluded that the white sugar whether extracted from conventional sugar beet or from biotech sugar beets is the same, with no difference in nutritional value or composition. It also projects the market to register 6. Other End Products Consisting Pressmud, Beet Pulp, Bagasse, and Molasses to Gain Maximum Traction Among various products made using sugar beet, other end products consisting pressmud, beet pulp, bagasse, and molasses are likely to gain more than half of the revenue share by end. Sugar beet molasses is being used as a de-icing agent on roads, as it does not corrode. Moreover, sugar beet pulp and molasses are used as a feed for livestock. These by-products from processing sugar beet are also being used in commercial backing, alcohol production and pharmaceuticals. Also, waste lime to increase soil pH levels is being made from sugar beet by-products. Beet Processing Industry to Gain Maximum Revenue Share Beat processing industry is likely to emerge as the largest user of the sugar beet. Other than the rise in the production of sugar from sugar beet, there has been a rise in the use of by-product obtained by processing sugar beet. Hence, the beet processing industry is accounting for the increasing using sugar beet. Europe to Rule the Global Market for Sugar Beet Europe is likely to emerge as the largest region in the global market for sugar beet. Most of the sugar beet is cultivated in the northern part of the Europe, due to the favorable climate suitable for growing sugar beet. The countries contributing towards the sugar beet production are France, U. Moreover, in order to support the sugar beet production and farmers, nearly eleven EU countries have agreed to provide support sugar beet producers. Meanwhile, North America is also likely to witness growth in the sugar beet production in the coming years. Global Sugar Beet Market: Overview Sugar whether produced from sugar beets or sugar cane grown using any method i. Sugar beet is a member of Amaranthaceae family. Sugar beet grows underground and is harvested and processed differently. Sugar beets are eaten raw and even in the cooked form, however, sugar manufacturers are using sugar beet to produce refined sugar, brown sugar and other products such as molasses, pressmud, etc. Sugar beet is being used both as a source of sugar and the plant residue is also being used as a fuel. The by-products that are obtained from processing the beets into sugar molasses and pulp are used on a large scale as fiber-rich supplemental feed for livestock. Research Methodology The report on the global sugar beet market offers in-depth analysis of the various factors driving and acting as a restraint in the growth of the market. The report also talks about the trends and opportunities, major technological advancements and competitive landscape. The research also provides a comparative analysis and expected growth of the various market segments by conducting an analysis of the growth during the past period. The report offers information on the major factors playing an important role in the market and also in various key regions. New technologies being used by the manufacturers in processing sugar beet to produce end product is also given in the report. The report offers analysis of the overall sugar beet market taking into account the various factors such as opportunities, drivers, and challenges. Additionally, key developments in the market have also been given in the research report. These developments talk about the series of events that occurred in the past and the events that are likely to

take place in the future. The report also offers detail on standards and regulations in various regions on producing end product using sugar beet. Market Segmentation The global sugar beet market is segmented into the end product and end use industry. On the basis of the end product, the market is segmented into direct use, raw sugar, refined sugar, brown sugar, and other end products beet pulp, molasses, bagasse, pressmud. On the basis of end use industry, the market is segmented into beet processing industry, transportation fuel, and other end use industries. The report provides a country-wise analysis for each segment, along with the revenue share and CAGR during Competitive Analysis The global sugar beet market report offers in-depth analysis of the companies operating in the market.

Chapter 2 : â€¢ Sugar production worldwide /18 | Statista

Increase in sugar beet cultivation 28/02/ The cultivation area for sugar beets in the Netherlands grew by 21 percent in just one year, from nearly 71 thousand ha in to over 85 thousand ha in

Of more than twenty sugar-refining factories, most built between and , only the Fort Morgan factory remains in operation. Industry historians often note that at the turn of the twentieth century, the dramatic growth of sugar beet production proved that settlers living in Colorado could make the desert bloom. The sugar beet industry also diversified an economy reliant on mining and ranching, as rural Colorado towns came to produce millions of pounds of white granulated sugar. At the close of the nineteenth century, newly constructed sugar factories across the American West began to produce white refined sugar from sugar beets grown in local fields. Fostered by local and federal support, Colorado became a leading sugar-producing state. However, this agricultural transformation was at the expense of Native American land rights. These treaties removed the Cheyenne, Arapaho, Apache, Comanche, and Kiowa nations from Colorado, eventually resettling them on smaller reservations in Indian Territory, now Oklahoma. In an infamous decision, the United States unilaterally ratified the Medicine Lodge Treaty without the consent of the groups listed above. This opened the Platte and Arkansas River Valleys to settlers, who believed that American capital, European technology, and commercial farming would civilize Colorado. In , Ute Indian removal opened the Grand Valley to agricultural settlers. Swink worked to get the attention of land and water companies. These companies sold cheap mortgages and water rights to potential farmer-settlers and to beet sugar companies hoping to establish a German-origin industry in the American West. They succeeded in convincing East Coast capitalists that Colorado had friendly politicians, farmer interest, and fertile river lands and that regional nonwhite workers would come for spring planting and leave with the harvest. The sugar beet industry expanded rapidly in Colorado. American sugar companies helped German and French sugar beet experts immigrate to the United States and imported seeds and factory machinery across the Atlantic. Yet Colorado sugar towns needed more than European expertise and technologies to get off the ground; they also needed workers. The Work of Making Sugar Sugar beet cultivation required careful work that could only be done by hand. In Louisiana, sugar cane plantation owners replaced enslaved African Americans with Chinese contract workers. However, the United States banned Chinese workers in and outlawed contract labor in Sugar beet growers found it difficult to recruit field laborers at the wages they wanted to pay. Sugar beet growers to the east and west of the Continental Divide employed Native American workers from regional Indian schools and reservations. Companies also recruited workers from Hispano communities in southern Colorado and northern New Mexico. Native American and Hispano workers took sugar beet work in order to survive the changes that American colonization brought to their lives after the end of the Mexican-American War in and during the ensuing Indian Wars. Colorado sugar companies also recruited diverse fieldworkers from communities marginalized in white American towns and labor markets. These workers were often noncitizens, recent immigrants or refugees, and nonwhite. From its first years, the industry also employed incarcerated workers. Seasonally, sugar beet factories employed to workers, typically white American men, who in the s and s unionized and gained some bargaining power. However, each harvest required thousands of nonunionized fieldworkers. These individuals are often left out of Colorado histories, yet they contributed the bulk of human energy needed to convert beets into sugar. Without their labor, the sugar beet industry and other labor-intensive agricultural industries in Colorado would not have prospered. Sarah Deutsch, No Separate Refuge: Oxford University Press, State University of New York Press, Moon-Ho Jung, Coolies and Cane: Johns Hopkins University Press, The Beet Sugar Industry in Microcosm: University of California Press,

Chapter 3 : â€¢ Sugar beet cultivation: phytosanitary treatments France | Statistic

Growing Sugar Beets: Sugar Beets, are a larger, sweeter version of its familiar red-rooted garden cousin most commonly grown by commercial producers. Small-scale growers are also using sugar beets as a livestock feed and for planting in wildlife plots to attract deer.

I live and farm with my husband and three young sons in the Red River Valley region of eastern North Dakota, where we grow sugar beets, dry beans and wheat. Sugar beets are a root crop, and flourish in temperate climates where the growing season is about five months long. Sucrose is a carbohydrate that occurs naturally in fruits, vegetables, and other agricultural crops, but occurs at greater levels in sugar beets and sugarcane. Sugar was first isolated from beet roots in by Andreas Marggraf , in what is now Poland. The sugar beet then journeyed to France when Napoleon ordered that 69, acres be devoted to growing the new crop. Sugar beet production in North America began in at a farm in Alvarado, California. Sugar beets being stored in piles during the harvest. The sugar from sugar beets and sugarcane is identical, and is the same as the sucrose found in any other agricultural crop. The molecular structure of sugar is the same regardless of whether it comes from sugar beets or sugarcane. The molecular structure of the sugar is also the same regardless of whether the sugar was obtained from plants grown with conventional, organic, or precision breeding practices. So, if a package of sugar is labeled as organic, it only means that the plant the sugar came from was grown according to organic agriculture standards. The final white sugar is the same. Whether from a conventional or biotech plant, from sugar beets or sugarcane, sugar has the same nutritional value, composition and wholesomeness, and is a natural plant product. Regulatory agencies all over the world have concurred that the white sugar extracted from biotech sugar beets is no different than the white sugar extracted from conventional sugar beets or sugarcane. Thanks to genetic engineering , sugar beet farmers are able to apply safer and less chemicals less often to control weeds. Farmers are the ultimate environmentalists and stewards of the land. Thanks to genetic modification, this is possible. Today, sugar beet farmers are able to use glyphosate, the mildest and safest product available, for weed control. This is a win-win for the health and safety of consumers and farmers. Genetically engineered sugar beets require far fewer pesticides, which in turn, means less water, less fuel and a smaller carbon footprint. Twenty-five specific environmental benefits of growing genetically engineered sugar beets have been identified. These include promoting low or no tillage farming, improved soil health, an increase of water retention in soil, greater soil and water conservation, and less emissions of greenhouse gases; all of which contribute to long-term sustainability. Also, growing genetically engineered sugar beets allows farmers to grow more sugar beets on less land while using fewer chemicals. On the left is what farmers used to spray on non-GMO sugar beets. On the right is what they spray now! The sugar beets are planted in the spring and grow throughout the summer. Here in the Red River Valley, the harvest starts on October 1 and usually lasts two weeks. Sugar beets are a perishable vegetable, but because of the extremely cold winter temperatures, North Dakota and Minnesota are some of the few places in the world where the harvested sugar beets can be stored in outdoor piles. Trucks then transport the crop to the factories, which operate around the clock, seven days a week, from October through April. For a great explanation and photos of the how sugar is extracted from sugar beets, check out the Red River Valley Girls blog.

Chapter 4 : Sugar beet - Wikipedia

A sugar beet is a plant whose root contains a high concentration of sucrose and which is grown commercially for sugar production. In plant breeding it is known as the Altissima cultivar group of the common beet (Beta vulgaris).

A bit of history A century ago some two dozen factories peppered Michigan. The majority of the plants were centered in the Saginaw Valley and the Thumb area, where the remaining factories still operate. A small sugar-beet factory was constructed, but operations ceased in after months of frustration from poor cash flow and rudimentary processing methods. Kedzie, a chemistry professor at Michigan Agricultural College present-day Michigan State University , initiated statewide testing of the beets using the seeds that Seaman brought back from Germany. Although the map below is slightly hard to read, it makes an important point about the kinds of sweeteners we use in the USA, and where they are grown. Sugar cane, a tropical grass with sweet, sugary juice in its stalks, is grown in Florida, southern Texas, and Hawaii red on the map. Sugar beets, grown in areas shown in blue, are concentrated in the north, primarily because storing the beets after harvest is easier in cool climates. Beets provide an important sweetener for mid-latitude states and nations. Michigan sugar under the Meijer, Pioneer and other local brands comes primarily from sugar beets. Lastly, corn syrup, made from corn kernels, is becoming the sweetener of choice for many kinds of foods such as soda. Wherever corn is grown yellow areas , high fructose corn syrup can be an important byproduct. Maph by Randy Schaetzl, Professor of Geography - Michigan State University Michigan has nine million plus people and has more demand for sugar than all the sugar manufactured in the state. Are we dangerously sucrose-addicted consumers? The demand comes from large manufacturers like Kellogg, Lifesavers and Post and from Michigan cherry producers. In Michigan, the main beet-growing areas are on the flat, clay soils of the Saginaw and Erie lowlands. In a process that has remained relatively unchanged during the past years, grubby, pale sugar beets are transformed into the granules we pour into our morning coffee. During harvest in the fall, producers use a machine called a rotor beater to cut off the tops of the beets, which are left in the field. The removal of the foliage is called "topping". As those living on the east side of the state know, during autumn the odd sugar bet appears along roadways, a large grayish white road hazard startling in its resemblance to a big rock. Photograph by Randy Schaetzl, Professor of Geography - Michigan State University Sugar beets are dug by large mechanical harvesters and taken by truck to processing facilities. In Michigan, beets are typically dug in late October. Photograph by Randy Schaetzl, Professor of Geography - Michigan State University This truck will drive directly from the beet field to the processing plant, with its load of sugar beets. At the plant, the beets are piled into large stacks; processing takes place until February. More than four thousand tons of beets rumble through these flumes each day during a typical campaign, which runs twenty-four hours a day, seven days a week, from September through February or March. In the factory, the beets are first cleaned in a beet washer to remove most of the soil and stones. Some 60 tons of stones removed daily from the flumes are sold to landscapers or crushed for roads. Next the beets are pumped to the beet washer, which cleans away mud and sand and contains a magnet to remove metal bits. Freshly washed, the beets jiggle down toward the slicers, oblivious of their imminent fate. Through the slicers they go, and below the machines a conveyor belt marches out the sliced beets or cossettes, that resemble cottage french fries, or a cross between shoestring potatoes and ridged potato chips. This process "opens" the beet up and allows the sugars within to be readily extracted. The beet "noodles" cossettes are sent through a machine called a diffuser or extractor. Hot water is mixed with the beets to dissolve and remove the sugar from the beet noodles. The beets disappear into a diffuser. Through osmosis, sugar is extracted from the cossettes that are immersed in hot water. The beet pulp is squeezed, dried and formed into pellets to be sold for livestock feed and pet food. The water and sugar juice are saved, and this solution is called "raw juice". Impurities in the raw sugar juice are removed by mixing the juice with milk of lime treated with carbon dioxide gas. From this carbonation process, the product next goes to the Olivers, where the lime cake "mud" is separated from the juice. The beet noodles, now free of most of their sugar, are dried into beet pulp for livestock feed. The raw juice is treated with lime $CaCO_3$ and carbon dioxide gas to clean the mixture again. It is sent through a big, round filter to clean it and remove other

non-sugars. The raw juice goes into a series of big tanks called evaporators where some of the water is boiled off. At this point, the mixture contains more sugar than water. It is a thick-like syrup and is again filtered to make sure it is very clean. When one piece of machinery fails, "the guys can turn it off and keep the process going. After the dried pulp and lime cake have been removed, the next step is evaporation. Sugar beets are primarily water and the excess must be removed in a series of evaporators. Boiled under vacuum, the juice flows from one evaporator to another until a heavy syrup, which is filtered once again, remains. In the crystallizers, the syrup is boiled, stirred and cooled, and crystals begin to form. At this point what began as sugar beets becomes massecite, a syrupy liquid containing the grit of crystallization. On the pan floor, sugar continues boiling under vacuum and takes on the consistency of fudge. Workers, once known as sugar tramps, keep track of the product through computer readings, touch and taste. The heavy liquid heads to the centrifugals, where machines whirl the sugar at 1, revolutions per minute and dry it with filtered, heated air. The syrup exits through minute holes in the centrifugals, leaving pristine white sugar crystals. The remaining bitter syrup is molasses, a product used in the manufacture of citric acid, antibiotics, yeast and other products. The whole process, if you were to follow one beet, lasts four to five hours. One copy may be printed for personal use. Please contact Randall Schaetzl soils msu.

Chapter 5 : 5 Things To Know About Sugar Beets | GMO Answers

Sugar beet is a popular plant used in the commercial production of sugar, as the root contains a high concentration of www.nxgvision.comg sugar beets is not that difficult, especially since they can grow in a variety of climates and soils.

When selecting a sugarbeet yield goal and requesting fertilizer recommendations, remember that recoverable sugar is the product desired. Over-fertilization, particularly with nitrogen, can result in poor quality beets and reduced net returns. Therefore, judicious use of manageable factors such as nitrogen fertilizer, early planting, even spacing, adequate plant populations, weed control, timeliness of operations, disease and insect control all will improve recoverable sugar yield. Significant responses are most likely to occur when soils test very low to low in phosphorus or have low levels of available nitrogen in the top 6 in. Sugarbeet seeds and seedlings are sensitive to fertilizer salts. Germination damage may occur if excess nitrogen or potassium fertilizer is placed in direct contact with seed. In some areas, straight phosphate fertilizer materials may not be available in sufficient quantities. In this case, use monoammonium phosphate or liquid as a starter fertilizer. Seed germination reduction should be negligible from 5 or less pounds of nitrogen per acre in contact with beet seed and any slight effect would be more than offset by the improved yields from the banded phosphorus application on very low-testing soils. On soils testing medium or above, the crop is much less dependent on applied fertilizer. On very low testing soils where the plants depend largely on fertilizer for their needs, the method of application will influence the amount of fertilizer that plants can recover. Broadcast fertilizer is thoroughly mixed with the soil and, as a result, some is positionally unavailable to plant roots. Band or drill row fertilizer is applied closer to the seed and can be recovered more efficiently by the crop. Sugarbeets are among the crops least susceptible to secondary and micronutrient deficiencies. The exception may be a susceptibility to boron and manganese shortages. Zinc deficiency has been reported on infrequent occasions in Minnesota. Responses to other micronutrients have not been reported or demonstrated. A soil test for these nutrients will answer questions that arise about possible needs for manganese, copper, or iron. Calcium deficiency may be observed in sugarbeets in Minnesota and North Dakota. However, the deficiency apparently is a physiological problem. Soils in this area are high in calcium and application of calcium-containing fertilizers will not correct the deficiency. Yield losses due to this problem have not been documented. Commercial sugarbeet variety development has been exclusively by private sugar and seed companies in the United States. These evaluations are used to establish a list of approved varieties which insures the use of the most productive varieties to maximize returns to the growers and sugar companies. Sugarbeets are poor competitors with weeds from emergence until the sugarbeet leaves shade the ground. Emerging sugarbeets are small, lack vigor, and take approximately two months to shade the ground. Thus, weeds have a long period to become established and compete. Sugarbeets are relatively short even after they shade the ground so many weeds that become established in a field prior to ground shading will become taller than the sugarbeets, shade the sugarbeets, and cause severe yield losses. To avoid yield loss from weed competition, weeds should be totally controlled by four weeks after sugarbeet emergence and weed control should be maintained throughout the season. A combination of cultural, chemical, and mechanical weed control methods should be used to maximize weed control in sugarbeets. Some weed species such as kochia, common mallow, common milkweed, and velvetleaf are difficult or impossible to control selectively in sugarbeets with herbicides. These weeds in particular, and all weeds in general, should be effectively controlled in other crops in the rotation. Spot spraying or hand weeding small areas should be used to prevent establishment of problem weeds. Sugarbeets should not be planted on fields badly infested with problem weeds. Cultivation with a row crop cultivator is a universal and essential weed control method in sugarbeets. Also, the rotary hoe or spring tine harrow can be used to remove small weeds from well rooted sugar beets. Ile decision on using hand weeding or other methods of weed control should be based on expected economic returns. Generally herbicides will be more cost effective than hand weeding in moderate to heavy weed densities. Hand weeding may be more cost effective in low weed densities, especially if the target weed species are herbicide tolerant or too large for effective control. Preemereence Contact or Tillage Substitution Herbicides. Glyphosate several trade names

can be applied before sugarbeets emerge, to emerged weeds at 0. Use the higher rate on larger weeds, more resistant weeds, or if the plants are under moisture stress. When low rates of glyphosate are used, apply in 3 to 10 gallons of water per acre by ground or in 3 to 5 gpa by air. Delay tillage for at least 3 days after treatment. Glyphosate is a non-selective translocated postemergence herbicide with no soil residual activity. A non-ionic surfactant should be used with glyphosate. Paraquat Gramoxone Extra can be applied before sugarbeets emerge to emerged weeds at 0. Apply in 5 to 10 gpa of water by air or in 20 to 60 gpa by ground. Paraquat is a non-selective contact herbicide with no soil residual activity. A nonionic surfactant should be used with paraquat. Good weed control with preemergence non-incorporated herbicides requires rainfall after application. Herbicides which are incorporated into the soil surface usually require less rainfall after application for effective weed control than unincorporated herbicides. Weeds emerging through a preemergence; herbicide treatment may be controlled by rotary hoeing or harrowing without reducing the effect of the herbicide unless the harrow or rotary hoe removes the herbicide from a treated band. The reasons for using soil-applied herbicide in sugarbeets include the following: To reduce early season weed competition. To make postemergence herbicides more effective by increasing weed susceptibility and by reducing the total weed population. To provide weed control if unfavorable weather prevents timely cultivations or postemergence herbicide applications. A single herbicide treatment usually will not give total weed control. A preemergence or preplant incorporated herbicide followed by postemergence herbicides often will improve weed control compared to preemergence or preplant incorporated herbicides alone or postemergence herbicides alone. Many herbicides applied before crop and weed emergence need to be incorporated to give optimum weed control. Weed control from ethofumesate Nortron , pyrazon Pyramin , and diethatyl Antor generally is improved by incorporation. Cycloate Ro-Neet and EPTC Eptam should be incorporated immediately after application regardless of whether the liquid or granular formulation is used. Ethofumesate Nortron , diethatyl Antor , and pyrazon Pyramin may be used preemergence but incorporation usually improves weed control, especially on fine-textured soils or with limited rainfall after application. Incorporation may reduce weed control if heavy rains follow application and incorporation may increase sugarbeet injury compared to surface application. Experience indicates that lack of rainfall is more common than excess rainfall following planting. An estimate of the efficiency of an incorporating tool can be obtained by operating the tool through flour or lime which has been spread thickly over the soil. A thorough incorporation should cover most of the flour or lime and give uniform mixing through the soil. Several tillage tools have been used successfully for the incorporation of herbicides. Some herbicides require more thorough incorporation than others and the incorporation method should be matched to the herbicide. Cycloate and EPTC require a thorough incorporation and should be incorporated by one of the following methods or a method which will incorporate similarly. A tandem disk should be set at a depth of 4 to 6 in. Operating speed should be 4 to 6 mph. Tandem disks with disk blades spaced 8 in. Larger disks often give streaked incorporation and poor weed control. Field cultivators of various types may be used. These should have overlapping sweep shovels with at least three rows of gangs and the operating depth should be 4 to 6 in. A harrow should follow the field cultivator. The operating speed necessary to achieve a satisfactory incorporation will vary somewhat depending on the type of field cultivator but the speed usually will be 6 to 8 mph. Field cultivators with Danish tines plus rolling crumblers behind have given good herbicide incorporation. These tools should be operated 4 in. Adequate incorporation with one pass may be possible with these tools if soil conditions are ideal for herbicide incorporation. However, a second incorporation may be good insurance against poor weed control. Power driven rototiller-type equipment will give adequate incorporation when set to operate at a depth of 2 to 3 in. A single incorporation with a power driven rototiller is sufficient for cycloate or EPTC. However, a second tillage at right angles to the initial incorporation should be done if the disc or field cultivator is used. The second incorporation has two purposes: Most of the herbicide left on the surface after the first incorporation will be mixed into the soil with the second tillage. The second tillage will give more uniform distribution of the herbicide in the soil which will improve weed control and may reduce crop injury. Ethofumesate, diethatyl, and pyrazon do not require deep incorporation. A tillage tool operating at a minimum depth of 2 in. EPTC sometimes causes sugarbeet stand reduction and temporary

stunting. However, no yield reduction will result if enough sugarbeets remain to obtain an adequate plant population after thinning. EPITC should be used with extreme caution on sugarbeets grown in loam or coarser-textured soils with low organic matter levels because a safe EPTC rate is difficult to predict on such soils. EPTC tends to give better weed control than cycloate on fine-textured, high organic matter soils or under relatively dry conditions while cycloate gives better control than EPTC when spring rainfall is adequate to excessive. Cycloate causes less sugarbeet injury than EPITC and is thus safer for use on more coarse textured, low organic matter soils. The rate of application of the mixture must be adjusted for soil texture and organic matter. Suggested fall applied rates are: Suggested spring applied rates are: These rates may need to be adjusted on certain fields or with certain incorporation tools based on individual experience.

Chapter 6 : How to Grow Sugar Beets | HowStuffWorks

Sugar Beets look more like a turnip than a beet. Their coloring is off-white and conical in root structure. About 20% of the world's sugar production is from sugar beets and the other 80% coming from sugarcane.

The sugar beet as a crop is much newer than either soybeans or sorghum. Although beets had been a source of sweets among ancient Egyptians, Indians, Chinese, Greeks, and Romans, it was not until that a German apothecary, Andreas Marggraf, obtained sugarâ€¦ Culture The sugar beet has long been grown as a summer crop in relatively cool parts of the temperate zones of the world. More recently it has been grown as a winter crop in the warm regions of the temperate zones, including parts of South America , Africa, the Middle East , and southern Europe. The growing period from sowing to harvesting is â€” days. A good yield of beet roots is obtained when the climate has been mild throughout the growing period, and a suitable sucrose content is secured when the last period of growth has been cold. In the case of a winter crop, the ripening period occurs in the spring and is promoted by withholding water to the beet. Sugar beets require a well-distributed precipitation of about mm 24 inches , and the crop must be irrigated if precipitation is deficient. Both sugar beets and sugarcane contain high concentrations of sucrose and are processed into sugar. AdstockRF Sugar beets are grown from seed and can be sown in various soils ranging from sandy loam to heavy clay. The seedbed is prepared by deep plowing after the preceding crop is harvested. An ideal soil is loam rich in humus , deep and homogeneous , having appropriate adhesion and mild moisture-holding capacity. Before sowing, the seeds are treated with disinfectants for black root disease. On industrial farms, precision drills sow seeds at a depth of 2 to 4 cm 0. Fertilizers are applied simultaneously with the seeds, and, after covering, herbicides are applied by spray. The germination of the seeds occurs about 10 days after sowing. Fertilizers are applied to sugar beets from the beginning of sowing through the entire growth period. Nitrogen fertilizer increases the weight of beet roots but delays ripening. Potash is well absorbed by sugar beet, increasing the root weight, but, again, if too much potash is absorbed, ripening is slowed down, and magnesium deficiency can occur. The absorption of phosphate is less than that of nitrogen and potash, but it increases beet root weight and accelerates ripening. A mature sugar beet root can grow to 1â€”2 kg 2. Sugar beet harvesting usually starts in late September or early October for summer crops and is performed rapidly so as to finish before the soil freezes. There are two methods of harvesting. In the Pommritzer method the topping and the lifting of the roots are performed by two separate machines. In the other method the two operations are carried out by one machine. Sugar beet crops are typically rotated with corn maize or wheat every four to six years in order to lessen the damage caused by Rhizoctonia root rot or sugar beet nematodes Heterodera schachtii. Diseases and pests The beet plant is subject to many diseases and insect pests. Black root rot, a fungus disease characterized by lesions in the stem near the soil surface, and Cercospora leaf spot, a fungus infection in which the leaves become greenish yellow and root weight and sugar content are reduced, are most serious and can cause great damage if not controlled. Precautions must also be taken against damage by worms, beetles, and nematodes. Knots on a root of sugar beet caused by root-knot nematodes. Breeding Disease-resistant beets of higher sucrose content and heavier root weight are constantly sought. Sugar beets are cross-pollinated plants, and most commercial varieties are hybrids. Superior polyploid varieties having multiple sets of chromosomes have been developed. In the United States and other countries, most commercial sugar beets have been genetically modified for resistance to the herbicide glyphosate.

Chapter 7 : Sugar beet - How to grow plants

Beet sugar is one of the most cultivated sweeteners in the world and one that the food industry relies on heavily for processed food production. How smart consumers are avoiding it at all costs, and which healthier and safer alternatives they are choosing instead.

Sugarcane refers to any of several species, or their hybrids, of giant grasses in the genus Saccharum in the family Poaceae. They have been cultivated in tropical climates in South Asia and Southeast Asia over centuries for the sucrose found in their stems. A great expansion in sugarcane production took place in the 18th century with the establishment of slave plantations in the Americas. The use of slavery for the labor-intensive process resulted in sugar production, enabling prices cheap enough for most people to buy. Mechanization reduced some labor needs, but in the 21st century , cultivation and production relied on low-wage laborers. The crop is harvested mechanically or by hand, chopped into lengths and conveyed rapidly to the processing plant commonly known as a sugar mill where it is either milled and the juice extracted with water or extracted by diffusion. The resulting thin syrup is concentrated in a series of evaporators, after which further water is removed. The resulting supersaturated solution is seeded with sugar crystals, facilitating crystal formation and drying. The crystals of raw sugar have a sticky brown coating and either can be used as they are, can be bleached by sulfur dioxide , or can be treated in a carbonatation process to produce a whiter product. Sugar refinery , Non-centrifugal cane sugar , and White sugar A pack of sugar made from sugar beet Refined sugar is made from raw sugar that has undergone a refining process to remove the molasses. While raw sugar can be consumed, the refining process removes unwanted tastes and results in refined sugar or white sugar. The first stage is known as affination and involves immersing the sugar crystals in a concentrated syrup that softens and removes the sticky brown coating without dissolving them. The crystals are then separated from the liquor and dissolved in water. The resulting syrup is treated either by a carbonatation or by a phosphatation process. Both involve the precipitation of a fine solid in the syrup and when this is filtered out, many of the impurities are removed at the same time. Removal of color is achieved by using either a granular activated carbon or an ion-exchange resin. The sugar syrup is concentrated by boiling and then cooled and seeded with sugar crystals, causing the sugar to crystallize out. The liquor is spun off in a centrifuge and the white crystals are dried in hot air and ready to be packaged or used. Brown sugars are granulated sugars, either containing residual molasses, or with the grains deliberately coated with molasses to produce a light- or dark-colored sugar. They are used in baked goods, confectionery, and toffees. They are also used as a preservative to prevent micro-organisms from growing and perishable food from spoiling, as in candied fruits, jams, and marmalades. They are used in the food processing of a wide range of products including beverages, hard candy , ice cream , and jams. Maltodextrin is an easily digestible synthetic polysaccharide consisting of short chains of glucose molecules and is made by the partial hydrolysis of starch. They are used as powdered sugar also known as icing sugar or confectionary sugar , for dusting foods and in baking and confectionery. Polyols are sugar alcohols and are used in chewing gums where a sweet flavor is required that lasts for a prolonged time in the mouth. They are used for decorative table sugars, for blending in dry mixes and in baking and confectionery. They are used to sweeten drinks. This shape is still in use in Germany for preparation of Feuerzangenbowle as well as Iran and Morocco. Syrups and treacles are dissolved invert sugars heated to develop the characteristic flavors. Treacles have added molasses. They are used in a range of baked goods and confectionery including toffees and licorice. If the must formed by pressing the fruit has a low sugar content, additional sugar may be added to raise the alcohol content of the wine in a process called chaptalization. In the production of sweet wines, fermentation may be halted before it has run its full course, leaving behind some residual sugar that gives the wine its sweet taste. After cereals and vegetable oils, sugar derived from sugarcane and beet provided more kilocalories per capita per day on average than other food groups.

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Today sugar beet production is a small part of Colorado's economy, but in the twentieth century it was the most important agricultural activity in the state. Of more than twenty sugar-refining factories, most built between and , only the Fort Morgan factory remains in operation.

Sugar beet after a harvest. Sugar beet, cultivars of the common beet, contains a rich concentration of sucrose in its roots and is thus utilized for commercial sugar production. The sugar beet plant grows only in the temperate zone of the world, unlike sugarcane which grows in the subtropical and tropical zones. Description Of The Plant The sugar beet has a taproot that is conical, fleshy, and white. A rosette of leaves grow above the roots. The sugar produced by photosynthesis is stored in the root of the plant. The foliage of the plant is brilliant green and grows to about 14 inches in height. The broad leaves grow from the crown of the beet in a tuft. The Cultivation Of Sugar Beet The sugar beet requires soil that is rich in organic matter, especially humus, and retain a good deal of moisture. Although the crop can be grown in heavy loams or sandy soil, the ideal soil for sugar beet cultivation is sandy loam. Since cultivation to a depth from If irrigation facilities are lacking, a rainfall of mm is optimum. Production Of Sugar Beet In , ,, metric tons of sugar beet was harvested. Russia was the largest producer with 39,, metric tons of production. Worldwide, the average yield of the crop was Chile had the most productive sugar beet farms with a yield of France, United States, and Germany are the other three largest producers of sugar beet in the world. The sugar of the sugar beet is of primary value and the pulp left after sugar extraction is used as animal feed. In many countries, sugar beet is used to make alcoholic beverages. Sugary syrup prepared from sugar beet is used as a sweetening spread in sandwiches and other food products. Desugared beet molasses are often used as anti-icing products on roads during winter by road authorities in North America. Chemicals like uridine and betaine are produced as by-products of sugar beet processing. Sugar beets also form an important crop for crop rotation cycles.

Chapter 9 : Increase in sugar beet cultivation

Sugar beet, cultivars of the common beet, contains a rich concentration of sucrose in its roots and is thus utilized for commercial sugar production. The sugar beet plant grows only in the temperate zone of the world, unlike sugarcane which grows in the subtropical and tropical zones.

Description[edit] The sugar beet has a conical, white, fleshy root a taproot with a flat crown. The plant consists of the root and a rosette of leaves. Sugar is formed by photosynthesis in the leaves and is then stored in the root. Sugar is the primary value of sugar beet as a cash crop. The pulp, insoluble in water and mainly composed of cellulose , hemicellulose, lignin , and pectin , is used in animal feed. The average weight of sugar beet ranges between 0. The leaves are numerous and broad and grow in a tuft from the crown of the beet, which is usually level with or just above the ground surface. Beta vulgaris Modern sugar beets date back to midth century Silesia where the king of Prussia subsidised experiments aimed at processes for sugar extraction. Moritz Baron von Koppy and his son further selected from this strain for white, conical tubers. The Silesian sugar beet was soon introduced to France , where Napoleon opened schools specifically for studying the plant. He also ordered that 28, hectares 69, acres be devoted to growing the new sugar beet. Relevant discussion may be found on Talk: Please help to ensure that disputed statements are reliably sourced. August Creation[edit] "The beet-root, when being boiled, yields a juice similar to syrup of sugar, which is beautiful to look at on account of its vermilion color. However, because crystallized cane sugar was already available and provided a better taste, this process never caught on. This story characterizes the history of the sugar beet. The competition between beet sugar and sugarcane for control of the sugar market plays out from the first extraction of a sugar syrup from a garden beet into the modern day. The use of sugar beets for the extraction of crystallized sugar dates to , when Andreas Sigismund Marggraf, professor of physics in the Academy of Science of Berlin, discovered the existence of a sugar in vegetables similar in its properties to that obtained from sugarcane. He found the best of these vegetable sources for the extraction of sugar was the white beet. Upon their return, two small factories were constructed near Paris. Although these factories were not altogether a success, the results attained greatly interested Napoleon. Thus, when two events, the blockade of Europe by the British Navy and the Haitian Revolution against his brother-in-law, made the importation of cane sugar untenable, Napoleon seized the opportunity offered by beet sugar to address the shortage. In , Napoleon issued a decree appropriating one million francs for the establishment of sugar schools, and compelling the farmers to plant a large acreage to sugar beets the following year. He also prohibited the further importation of sugar from the Caribbean effective in The number was down to in , producing about A new tax levied in Germany in prompted the experimentation to increase the sugar content of the beet. This was because the tax assessed the value of the sugar beet crop based on the unprocessed weight of the sugar beet rather than the refined sugar produced from them. By , France had become the largest sugar beet producer in the world, a position it continued to hold in the world even into By , factories in France were producing 35, tonnes of sugar. However, by , Germany became the largest producer of sugar from sugar beet in the world, since the German factories processed most of the sugar beets grown in eastern France. This was made possible by the protection of the sugar beet industry by bounties, or subsidies, paid to beet sugar producers upon the export of their sugar by their respective governments. The result was a reduction in the production of cane sugar, molasses and rum until This resulted in a shortage that revived the shrinking cane sugar industry. The "Beet Sugar Society of Philadelphia" was founded in and promoted home-produced beet sugar as an alternative to the slave-produced cane sugar from the West Indies or sugar imported from Asia called "free sugar" because it was grown without using slavery , but which tasted "awful". First, the beet seeds they imported from France were not able to produce much sugar in the heavily salinized soil of Utah. Second, the cost of importing the beet seed from France ate up any possibility for profit. Finally, none of the people running the factory knew how to properly use the chemicals to separate the sugar from the beet pulp. Dyer at Alvarado, California now Union City , in , but did not see any profit until The factory survived on subsidies it gained, since the abolitionist stigma that had held back the development of a sugar beet industry had been

erased with the Civil War. In many of the regions where new sugar beet farms were started during the war, farmers were unfamiliar with beet sugar cultivation, so they hired Japanese workers from internment camps who were familiar with sugar beet production to work on the farms. United Kingdom[edit] Sugar beets were not grown on a large scale in the United Kingdom until the mids, when 17 processing factories were built, following war-time shortages of imported cane sugar. Before World War I, with its far-flung empire, the United Kingdom simply imported the sugar from the cheapest market. However, World War I had created a shortage in sugar, prompting the development of a domestic market. The first sugar beet processing factory was built at Lavenham in Suffolk in , but failed after a few years without the government support its counterparts on the continent received. The Dutch built the first successful factory at Cantley in Norfolk in , and it was moderately successful since, because of its Dutch backing, it received Dutch bounties. In , the British Sugar Beet Society was formed to create an example of a domestic sugar beet industry for the purpose of obtaining government financing. Twelve years later, in , they succeeded. The sugar beet industry in the United Kingdom was finally subsidized providing stability to the domestic industry that had experienced volatile shifts in profits and losses in the years since Jacob Esipov has built a first Russian commercial factory producing sugar from beets in the Tula province. The most important requirement is the soil must contain a large supply of plant food, be rich in humus , and have the property of retaining a great deal of moisture. A certain amount of alkali is not necessarily detrimental, as sugar beets are not especially susceptible to injury by some alkali. The ground should be fairly level and well-drained, especially where irrigation is practiced. A subsoil of gravel, or the presence of hard-pan, is not desirable, as cultivation to a depth of from 12 to 15 inches Climatic conditions, temperature, sunshine, rainfall and winds have an important bearing upon the success of sugar beet agriculture. High winds are harmful, as they generally crust the land and prevent the young beets from coming through the ground. Sunshine of long duration but not of great intensity is the most important factor in the successful cultivation of sugar beets. Near the equator, the shorter days and the greater heat of the sun sharply reduce the sugar content in the beet. In Michigan , the long summer days from the relatively high latitude the Lower Peninsula , where production is concentrated, lies between the 41st and 46th parallels North and the influence of the Great Lakes result in satisfactory climatic conditions for sugar beet culture. Sebewaing, Michigan lies in the Thumb region of Michigan; both the region and state are major sugar beet producers. Sebewaing is home to one of three Michigan Sugar Company factories. The town sponsors an annual Michigan Sugar Festival. Deep ploughing is the first principle of beet culture. It allows the roots to penetrate the subsoil without much obstruction, thereby preventing the beet from growing out of the ground, besides enabling it to extract considerable nourishment and moisture from the lower soil. If the latter is too hard, the roots will not penetrate it readily and, as a result, the plant will be pushed up and out of the earth during the process of growth. A hard subsoil is impervious to water and prevents proper drainage. It should not be too loose, however, as this allows the water to pass through more freely than is desirable. Ideally, the soil should be deep, fairly fine and easily penetrable by the roots. It should also be capable of retaining moisture and at the same time admit of a free circulation of air and good drainage. Sugar beet crops exhaust the soil rapidly. Crop rotation is recommended and necessary. Normally, beets are grown in the same ground every third year, peas, beans or grain being raised the other two years. At the northern end of its range, growing seasons as short as days can produce commercially viable sugar beet crops. In recent years, Syngenta has developed the so-called tropical sugar beet. It allows the plant to grow in tropical and subtropical regions. Until the latter half of the 20th century, sugar beet production was highly labor-intensive, as weed control was managed by densely planting the crop, which then had to be manually thinned two or three times with a hoe during the growing season. Harvesting also required many workers. Although the roots could be lifted by a plough -like device which could be pulled by a horse team, the rest of the preparation was by hand. One laborer grabbed the beets by their leaves, knocked them together to shake free loose soil, and then laid them in a row, root to one side, greens to the other. A second worker equipped with a beet hook a short-handled tool between a billhook and a sickle followed behind, and would lift the beet and swiftly chop the crown and leaves from the root with a single action. Working this way, he would leave a row of beets that could be forked into the back of a cart. Today, mechanical sowing, herbicide application for weed control, and

mechanical harvesting have displaced this reliance on manual farm work. A root beater uses a series of blades to chop the leaf and crown which is high in nonsugar impurities from the root. The beet harvester lifts the root, and removes excess soil from the root in a single pass over the field. A modern harvester is typically able to cover six rows at the same time. The beets are dumped into trucks as the harvester rolls down the field, and then delivered to the factory. The conveyor then removes more soil. If the beets are to be left for later delivery, they are formed into clamps. Straw bales are used to shield the beets from the weather. Provided the clamp is well built with the right amount of ventilation, the beets do not significantly deteriorate. Beets that freeze and then defrost, produce complex carbohydrates that cause severe production problems in the factory. In the UK, loads may be hand examined at the factory gate before being accepted. In the US, the fall harvest begins with the first hard frost, which arrests photosynthesis and the further growth of the root. Depending on the local climate, it may be carried out over the course of a few weeks or be prolonged throughout the winter months. The harvest and processing of the beet is referred to as "the campaign", reflecting the organization required to deliver the crop at a steady rate to processing factories that run 24 hours a day for the duration of the harvest and processing for the UK, the campaign lasts about five months. In the Netherlands, this period is known as de bietencampagne, a time to be careful when driving on local roads in the area while the beets are being grown, because the naturally high clay content of the soil tends to cause slippery roads when soil falls from the trailers during transport.