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**The Castor Bean in America**

The castor bean is a plant that has been essential in United States since the early 1800’s. It has been used for many different purposes throughout the years and continues to present new uses. This paper covers the history the castor bean in the United States, its adaptations, diseases, uses, and lastly its deadly toxin.

**History**

According to R.O. Weibel, the castor bean is not native to the Western Hemisphere and is believed to be introduced at an early date. However, the exact date that it was introduced to the United States is unknown probably due to the fact that it was such a minor crop. The same article states that the first record of the castor bean in America was in 1818 in Illinois before it was admitted into the Union (273). W.E. Domingo states that during this time the bean was harvested entirely by hand as is still done in some foreign countries. This was necessary to ensure that the bean itself didn’t shatter (65). Weibel goes on to say that they began to record more commonly in 1850. At that time there was 23 castor oil mills located in Illinois, Missouri, Virginia, Ohio, Tennessee, Pennsylvania, Alabama and Arkansas. Seventy percent of the domestic production of the castor oil in the western United States was out of St. Louis, Missouri (273).

Weibel says that between 1850 and 1870 the castor oil business began to decline and in 1870 there were only six mills remaining in operation. The remaining mills were located mainly towards the center of the state catering to the middle and west of the country (273). Domingo also says that due to the high labor requirement a lot of castor beans began to be imported from foreign nations in the early 1900’s (65). To support the need for castor oil on the east coast, that Weibel says foreign mills couldn’t provide for, new mills were opened. These mills are the ones that are mainly still in operation today.

 D.M. Crooks states the domestic production of beans was increased during WWI due to a large deficit in airplane engine lubricant (71). Due to this large need, Domingo says that the federal government developed programs to have the crop grown. 20 years later new programs were devolved when World War II erupted (65). Specifically in 1943, Illinois Farmers were contracted by the Commodity Credit Corporation to increase castor production so that the oil could be used during the war. The same article says that only 6,000 acres were grown during this time (66). The next year the program wasn’t sponsored due to marketing problems. However, Crooks article mentions that experimental testing was continued (71).

According to W. E. Domingo between the years of 1947 and 1951 domestic acreage increased from zero to eighty-four thousand acres and bean production reacting about forty-million pounds annually. Production goals for the year of 1952 were two-hundred thousand acres and about one-hundred million pounds of beans. This same journal states that throughout the castor beans history the plant has been domestically cultured three times and has failed each time (65-66).

**Adaptations and Growing, Diseases and Oil Production**

Weibel says that current adaptations of the castor plant have all been determined by the Bureau of Plant Industry, Soils and Agricultural Engineering and the State Agricultural Experiment Stations. Weibel says that there are three major things that determine if a plant has an adaptation. These factors are disease, length of growing season and rainfall required. Weibel also mentions that some variations have been bred into the castor bean and can be very useful.

The most noticeable of all the adaptations is the variations of seeds that are more adapted to temperate climates. This enables earlier planting and therefore, earlier crops. The same article says that the three most common variations are Connor, Doughty 11 and Kentucky 38. All of these varieties have a growing season of about 180 days, and require about 15 to 20 inches of rainfall (276). Domingo brings to light yet another noticeable adaptation was the production of the shatter-resistant shell. This allowed for a single harvest of the seed and resulted in a higher yield. Mechanical harvesting was also an excellent adaptation brought into the castor beans life. Domingo also says that this allowed farmers to have larger fields and thus resulted in larger crops (66). The best soils for growth, according to Weibel, have good surface and subsurface drainage, sub-soil permeability to allow air and water movement and lastly the soil needs to be Loam soil. In the United States the best location for these growing conditions are southern Kansas, Missouri, Illinois, Indiana, Ohio, Kentucky, Tennessee, Arkansas, Oklahoma and north Texas. A lot of these regions also happen to be where a lot of the first castor oil mills were opened (276).

Weibel states that there are diseases known to affect growth of the plant such as gray mold (*Sclerotinia recini* Godfrey), *Alternaria ricini, Phymatotrichum omnivorum and Cercospora ricinelli*. All of these diseases affect the plants growth in different ways. Examples of this include the *Phymatotrichum omnivorum* whichattacks the roots and makes them rot and *Alternaria ricini* which kills the young spikes on the outside of the fruit (279). The same article says that there are also a number of insects that can damage the plant including the green stink bug, leaf hoppers, leaf miners, nematodes and grasshoppers. These insects usually cause minor damage but still cause a noticeable difference (279). Some of the most dangerous killers of the castor plant are wind storms, hail, minor flooding and cold wet soil during germination. All of these damage the plant during one of their stages of growth resulting in low to no growth. (279)

The castor bean is used for its oil to lubricate machinery. Weibel says that each seed’s oil content varies from 50 to 55 percent and doesn’t change very much from year to year. However, the location of production can lead to a much higher or much lower percent of oil (280). To actually get the oil out of the seed the shell is removed, the seeds are heated to make the oil more motile and then the seeds are put into presses were the oil is squeezed out. The same article tells us that there are then two types of oil removed from the presses. The oil that is removed initially is called number one oil and only has to be bleached. However, a lot of oil is left on the press and it is removed later through solvent methods of extraction. This oil is called number three oil and it has to be refined to remove impurities (281).

**Uses and Toxin**

The oil of the castor bean is the main product used by humans today. Weibel states that castor oil is a special vegetable oil due to the fact that its chemical make-up is unlike any other vegetable oil. However, castor oil is used to make paint, varnish, soap, printing inks, linoleum, oilcloth, lubricants and greases. The residue that is left after the oil is extracted is called pomace. This pomace contains a toxin called ricin. Also stated in the same article is that ricin is a toxin that is unsuitable for live stock feed but due to its high content of nitrogen, phosphorus and potassium it is used as a fertilizer. According to R.C. Roark the leaves of the castor bean have been subject to research and have potential of being used as an insecticide (440). Weibel also says that the stems are used to create cardboard, wallboard, newsprint and other paper materials due to its high pulp and cellulose content (283).

The castor bean also includes a deadly toxin called Ricin. According to W.I. Jensen and J.P. Allen between November of 1969 and January of 1970 about 10,000 ducks died in Texas. Autopsies of the ducks revealed castor beans in their stomachs (185). Lewitus states that the castor oil plant contributes to large numbers of casualties annually. He also says that three seeds contain enough Ricin to kill a child and that 7 seeds can kill an adult (585-586).

 The castor seed remains a large source of lubricants used in machinery today and continues to show new possible uses. The search for new varieties and possibly better ways to grow the castor plant continues and will until the best possible product is formed. As stated by D.M. Crooks, “The future of castor bean cultivation in the United States depends on the price and amount of beans available through imports and the success of a program to improve varieties.” The fact that research is being conducted and this quotes message gives farmers a reason to keep growing and harvesting this potentially deadly but useful crop.

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