

# [Most documented growers and consumers of the](https://assignbuster.com/most-documented-growers-and-consumers-of-the/)

Mostof us are familiar with tomatoes, whether they come on our hamburgers or we eatthem right off the vines in our gardens. However, tomatoes were not alwaysconsidered to be a delicious food as we see them now. Tomatoes originated inSouth America during the times of the Mayan Empire, but they were notconsidered edible until approximately a century ago. The fruit of the plantwhen discovered was believed to be extremely poisonous since they are of thenightshade family, and were typically used in ornamental gardens or to decoratehomes. (TAMU Extension). History of the TomatoCultivated tomatoes are decendants of wild typetomatoes grown by Native Americans in the mountains of Peru, Bolivia, and Equador.

Some areas in those mountains today are still abundant with many wild typetomatoes. The first cultivated tomato species was carried down from the Andesmountains into Central America and Mexico around the same time as maize by amigratory group of indians. However, because the fruit of the tomato is sohighly perishable, this was one of the last crop species adopted by modernsocieties. After the plant was carried into Central America, it began to appearworldwide. The Italians are the first documented growers and consumers of thetomato with records dating back to almost 1550. Approximately 25 years later, the plant was being seen across all of europe (TAMU Extension). Economic ImportanceThe tomato is now one of the leading fresh marketcrops in the United States, ranking fourth among all fresh market crops percapita use. Fresh market tomato production in the united states has trendedupwards over the past several decades, with growth occurring most substantiallyduring the 1980s.

Florida and California account for approximately two thirdsof all fresh market tomatoes in the United States annually. Thetomato market is most active in the spring when Florida and other Southeasternstates, as well as California, begin to package and ship their crop (USDA ERS). During the 2016 tomato season, prices ranged from $8. 95 to $12.

95 depending onsize and variety (Packer). In 2012 global harvests yielded more than 162million tons of tomatoes, worth more than 55 billion dollars (Marcia). Characteristics of theTomatoTheSolanaceae family is a large family consisting of approximately 2500 speciesthat grow in numerous habitats all across the world. “ The Solanaceae familyincludes several plants of agronomic importance, including potato, eggplant, pepper, and tobacco, as well as tomato.” Currently, 360 varieties of tomatoeshave been genetically sequenced. Tomatoes have a diploid genome of simple architecturethat is distributed across 12 chromosomes (Sato). The tomato genome isestimated to be about 900 Mb long and contains 31, 760 genes. Tomatoesare a summer crop, being grown harvested and sold throughout the summer months.

This means that the fresh crop of tomatoes to be sold can only be found duringthis time of year, however, there are stored crops that may be found in marketsthroughout the rest of the year. If I were to work with tomatoes to geneticallymodify them, I would wish to work to make the plant more tolerant to colderclimates and temperatures so that fresh tomatoes can be sold and enjoyed byconsumers during a longer time period throughout the year. Improvement of the TomatoEventhough tomatoes are considered a summer time crop, there are some types thatare considered early season varieties that are more tolerant to cold weather. Tocreate a plant with cold tolerance I would choose to breed two plants thatalready have some sort of cold tolerance.

Most of the cold tolerant tomatoesare of the determinate or dwarf type, so when selecting a variety to breed withthese would be the best options (Northern). Scientists have also been workingwith tomatoes to make them more tolerable to colder temperatures by introducinga cold resistant gene that comes from a fish, the winter flounder (Lallanilla). For my purpose, these are the two types of plants that I would like to workwith to breed a winter grown, or more cold tolerant tomato plant. Unfortunately, there is little information to be found about the inheritance of these traitsfrom one generation to the next. In cases like this it is typically assumedthat the traits have quantitative inheritance with low heritability. BreedingTobegin the breeding process to adapt tomatoes to a cooler climate, I would beginby selecting two parent plants to begin breeding with.

For my parent varietiesI would choose the Cold Set Tomato and the Black Prince Tomato. Originating inCanada, the Cold Set tomato is an open pollinated, indeterminate species. It isa globe type tomato with a sixty-five day fruit production cycle.

The plant isalso tolerant to light frost. The Black Prince tomato is a heirloom varietythat is also indeterminate. This tomato is also a globe type tomato that has aseventy day fruit production cycle. The Black Prince tomato originated inSiberia and tolerates cold climates extremely well (Tomato). The Pedigree MethodWhenbreeding tomatoes, either backcross or pedigree breeding practices are used.

Formy purpose, since I am starting with two preestablished parent plants, I woulduse the pedigree breeding method. When using the pedigree method, typicallythree crosses are made. In each cross the male plant will be one variety(variety A) and the female plant will be of a separate variety (variety B). Ineach of the three replications, crosses will be made by pollinating four to sixflowers between the two plants. For example, since variety B is our female variety, four crosses will be made using the pollen from the variety A (male) plants tofour flowers on the variety B plants. Once fruit is produced on each of the 6plants, seed will need to be collected from 3 fruits from each plant (McKenzie).

The pedigree method will typically take about eight seasons to complete thebreeding cycle. The first step will be the growth and crossing of the threegroups (six total plants) of parent plants. This first season will producebetween five hundred and five thousand seed. These will be planted in seasontwo to become the F2 generation. From the F2 generation, approximately 250 plants will be selected. These plants will be grown as F2: 3progeny rows.

From these progeny rows, the best individual rows will beselected and then from these rows, the best individual plants (two or threeplants) will be selected. In season three, the F3: 4 lines will beproduced. From these lines, the best crop families will be chosen. From these families, the best rows and then best two plants in each row will be chosen. In thefourth season, the F4: 5 lines will be produced. The same steps aswere used in season three will be used to choose the best single plant in eachrow. During the fifth season, the F5: 6 generation will be produced.

From these plants, the best crop families will be chosen and then harvested inbulk. Season 6 will bring the testing of the F5: 7 generation lines. These tests will be replicated at two separate locations using one replicationper test location. During season 7, multi-environment test will begin on the F5: 8generation.

Each individual plant will be analyzed at each location andindividual fruits will be harvested based on appearance and what is determinedto be typical for fruit from the plants. This will initiate the development ofa pure seed line. Season eight will be a continuation of the multi-environmenttests. This will involve the growth of approximately one hundred F8: 9generation plants. These plants will be evaluated as were the plants in seasonseven to continue the development and enhancement of the pure seed line (Fehr). Secondary TraitsThemain focus of this breeding line is primarily to develop an early season orlate season cold tolerant tomato so that the crops fresh market life may beextended.

However, as the progeny lines are produced and tested, the plant willnot just be evaluated for cold tolerance. Since the tomato is such a consumerdriven crop, the fruit will have to be analyzed for appearance. Also, the plantwill need to have some resistance to typical tomato diseases such as fusariumand mosaic viruses, however these are likely secondary characteristics of thecultivar.

Breeder Seed ProductionTofully understand the release of breeder seed to the public, I turned to thelegal documentation written by the State of Texas and the Texas A&MAgriLife Extension service. This document outlines that the breeder hold fullresponsibility for completing and submitting a seed Release Proposal. Afterthis is done, to release new plant material, or seed, a public notice ofavailability must be made and the requests for those materials may be made by individualbreeders or private firms. At this point, applications for intellectualproperty rights such as patents or plant variety protection may be made.

Afterthis, individual breeders, private companies, and industrial groups may chooseto enter partnerships with the breeder releasing the new material to gainaccess to the genetic property. All distribution of plant materials after allof these previous processes are completed must be fully documented to avoid anyfuture problems such as ownership disputes, loss of property rights, andunauthorized distribution of materials (TFSS).