Marius Blasco

Colegio Bolivar

Actinidia deliciosa

Dr. Waliszewski

Agriculture Class August 7, 2020

Chapter 1: Introduction

This monograph contains information about the particular plant which some may know and others won't the plant is called Actinidia Deliciosa but for us is the Kiwi plant so while u read this monograph you will understand the life of this plant in general and what other discoveries have other people done when using this plant both for consumption and people all around the world, Also After reading this monograph people will understand why this plant is important to some persons and what can this plant gives for a further future, so please enjoy the monograph and hope u guys like it in general.

Keep in mind the name of the plant in case u guys want to go and research it because there are too many species of the same plant type so that is a little heads up.

Chapter 2: Ecology

2.1 Distribution

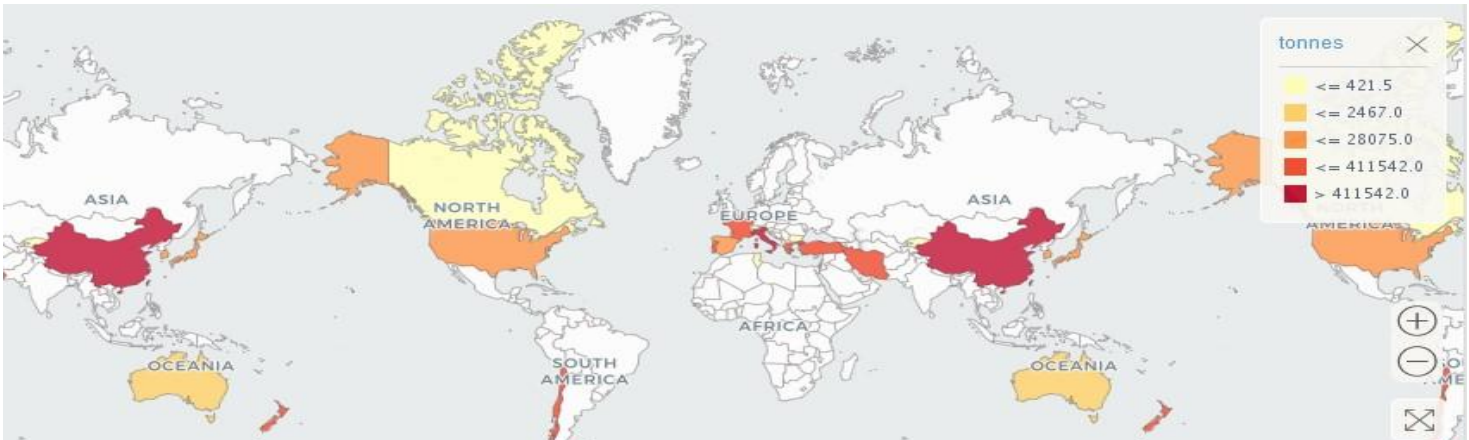
2.1.1 Affinity and Origin (Taxonomy and where did it come from)

In 1906 a nurseryman called Alexander Allison was the first person to plant a kiwi tree. Later on, in 1910 the first-ever kiwi plant was harvested in New Zealand. The Kiwi or *Actinidia deliciosa* is a climbing plant native to the slopes of the Himalayas, in southern China. It has been said that *Actinidia deliciosa* common name came from a bird called Kiwi and because of its green furry covered body, this plant was also introduced to New Zealand in 1904: it also grows as a vigorous woody vine reaching nine meters these plants have a total of 2n=64 chromosomes and are more than 50 different species of their plant. Taxonomy (Invasive Species Compendium CABI, 2020):

- Domain: Eukaryota
- Kingdom: Plantae
- Phylum: Spermatophyta
- Subphylum: Angiospermae
- Class: Dicotyledonae

2.1.2 Present Distribution

Hardy kiwis native distribution sweeps a wide band across Japan and into western China. It came to the United States in 1877 as an ornamental vine. The young shoots that climbed and twined at over 20 feet a year and the fragrant white flowers made hardy kiwi a popular choice. It quickly gained favor among New England elites and by the early 1900s was sprawling over estates from Bar Harbor, ME to Long Island, NY. Kiwi fruit is produced globally in 23 countries (FAO, 2020) as can be seen in the map below (Figure 1), including Turkey.



(“Kiwi—Origen y producción,” n.d.)

This map above shows the countries where Kiwifruit is distributed all over the world, mostly in the southern part of China.

,  

2.2 Environmental Factors Affecting Distribution

2.2.1 Elevation and Climate

Kiwi vines need to have winter temperatures below 45°F (7°C) for 600-700 hours. These cold temperatures are good for kiwi plants because A frost-free season of 225-240 days is needed for kiwifruit since vines leaf out in March, bloom in May, and are harvested in October or early November. Temperatures below 10°F (-12°C) in mid-winter will kill all young vines and some old bearing vines, and need frequent irrigation or rainfall.

2.2.2 Geology and Soils

I am going to talk about how the soil needs to be so the Actinidia Deliciosa can grow with no complications while in its development that’s why the soil has to be moist but well-drained a good temperature in between hot and cold is also needed and for last some but not too much sunlight. People need to make sure to have kiwi fruit that can adapt to cold or mild weather but some problems that might occur are mentioning the size in which you need to either grow the plant on a fence or arbor (“Growing Hardy Kiwi Vine In The Garden,” n.d.)

2.3 Vegetation Components

Some vegetations components are renewing fruiting arms which are done every 4 years, in the winter. The vines should be trained to fruit above the foliage instead of beneath it because excessive shading from the canopy results in poor shoot development, delayed blooming, dehydration and dying of flower buds, and reduced size of fruits. In addition, these plants should be kept an eye on, especially in New Zealand where the sun intensifies its light due to the sun's bright light it helps kiwi plants grow stronger and so they would last longer. “Actinidia deliciosa Fruit PFAF Plant Database,” n.d.)

2.3.1 Soil Environment and Effects of Soil

Three major components of harvesting kiwifruit are soil well-drained, water, and normal levels of sunlight, which helps the roots of this since these plants use a warm root system to gain nutrients. Kiwi plants do not tolerate salty soil at all. A mature orchard is said to require 40 in (1,000 mm) of water during the 8-month growing season, more than half of it in the three summer months. Some growers plant a permanent cover crop of inoculated clover to control dust, aid water penetration, and provide additional nitrogen for the kiwifruit crop. Sometimes Is good for the Kiwi plant “Animals That Like to Eat Kiwi Fruit,”.

(Saliyan, B, & S., 2017)

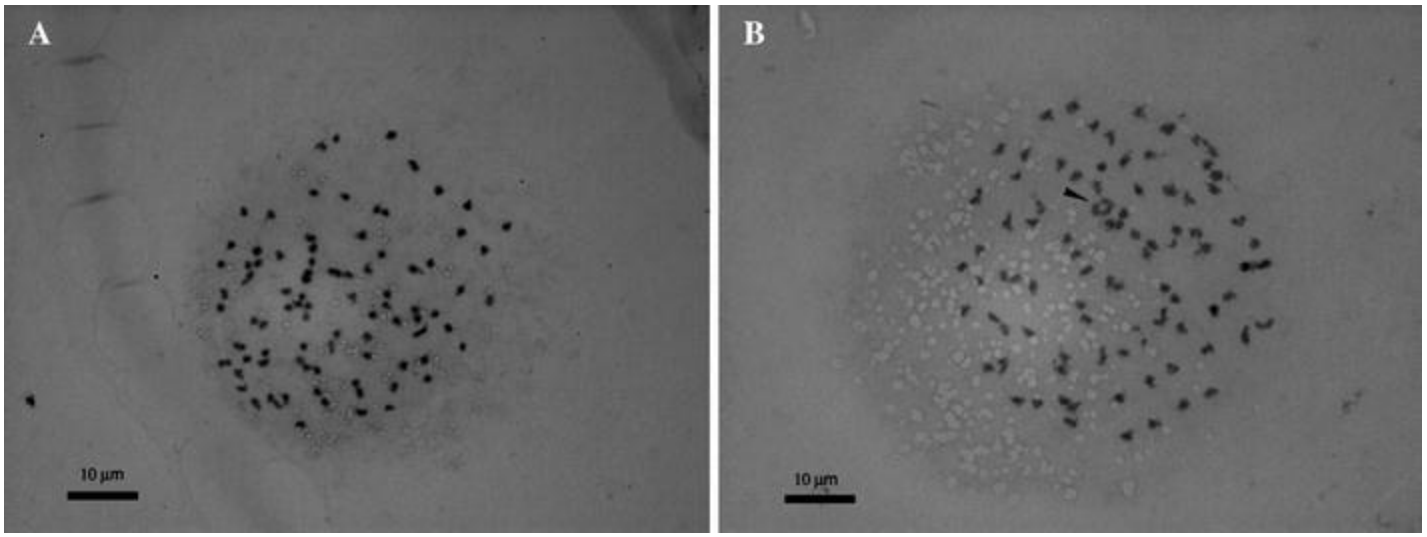
2.3.2 Interaction of Plant Roots and Relationship With Animals

Some interactions that the kiwi fruit has are mainly animals that eat them. For example, Koalas, which are native to Australia and New Zealand, like to eat kiwi plants, but In relation to other plants, *Actinidia deliciosa*, does not have problems. Kiwi Fruit, in general, does not have as many interactions as other plants would. As said earlier these plants need to be placed along with a female kiwi plant so they can reproduce at a faster rate

Chapter 3: Biology

3.1 Chromosome Complement

Actinidia deliciosa has 116 chromosomes in its molecule which may help the plant survive since with too many chromosomes then the plant may collect far more energy from the sun in the form of photosynthesis, in other words, more life. (“Kiwifruit Actinidia deliciosa—Reproduction,” n.d.)



3.2 Life Cycles and Phenology

Actinidia Deliciosas phenology is described as Actinidia Deliciosa plant offers protection to ovules and seeds which later become fruits but this plant life cycle starts with giving out pollen for other organisms or animals.

3.2.1 Seedling Protection (Germination, breaking off)

The Actinidia seeds are small with black color, but something important to have in mind is that the center of the Kiwi plant can be replanted so if germination occurs the plant will create a mature vine which means more seeds and fruits in a later future.

("seeding kiwi fruit—Buscar con Google," n.d.)

3.2.2 Flower Production

This process starts when the flower is open it also mentions that male kiwi plants give pollen seeds up to 2 or 3 days but the female flowers gain the seeds and can last up to 7 to 9 days straight after opening, in other words, it increases the chances of pollination which later results say that kiwi plants usually have a higher opportunity to reproduce to better explain male kiwi plants have a lower chance to pollinate with a female because of the number of days each plant have.

3.2.3 Foliage and Growth

Actinidia has a hard and extreme way of reproducing which starts by giving out fruits that later are used for other organisms as an energy source or to provide more plants so more of this delicious fruit may grow.

3.2.4 Seed Pods

The kiwi fruit has no seed pods but instead, it has special seeds in a nutshell called fleshy fruits which are formed from a single flower. As mentioned before it looks like the fruit basically but with the seeds inside of it as seen in the following picture.

(“kiwi fruit seeds—Buscar con Google,” n.d.)

3.2.5 Harvest

In order to harvest a Kiwi fruit which sometimes may be tricky, you need to snap the stem at the base of the fruit. Again, softness is not a great determiner for readiness. Size, date, and when in doubt, cut open fruit to access the seeds inside — when seeds are black, it is time for the kiwi fruit harvest, then Remove the larger fruit when harvesting kiwi and allow the smaller to remain on the vine and attain some size. (“Harvesting Kiwi

Fruit,” n.d.)

3.3.1 Pollen

Actinidia deliciosa has both male and hermaphrodite but only the hermaphrodite (Female) creates pollen is collected by the Petrides, later people grab the pollen grains and experiment with it to determine how long will the certain pollen be fresh for and something important is that kiwi plant pollen grains are measured with different methods such as water, acetocarmine, glycerin jelly, and any medium-dry conditions. (Mangalore, Negi, & Pant, 2017)

3.3.2 Sexuality and reproduction

The Actinidia kiwi fruit has a method to identify if the plant you are growing in female or male the process is simple people plant the plant and wait until it blooms when done specialists look at the stem of the plant to determine if male the stem is thicker but the female has a thin stem and shows if the Actinidia has any chance of producing fruit. (“Kiwi Plant Identification,” n.d.)

3.3.3 Pollination and potential pollinators

Kiwi plant The more pollen it gets, the more seeds it produces. Kiwifruit flowers are pollinated by insects, but the flowers are a bit unusual. The male and female reproductive parts are in separate flowers, which grow on

separate plants. Insects need to collect pollen from male flowers and take them to female flowers. Fruit only grows from the female flowers, so growers put a few male plants amongst many female ones, pollinators are animals that transport nectar or seeds from one place to another.. (“Pollinating kiwifruit,” n.d.)

3.3.4 Anthesis

Actinidia deliciosa anthesis means that the flower starts to open between 6 AM-8 AM in male flowers and 8 AM-10 AM in female flowers. Maximum anther dehiscence takes place 15 minutes after anthesis, also Maximus anthesis means the period or act of expansion for a flower, happens after 15 minutes from the first antithesis effect, meaning the opposite from each other. (Jignasa, 10:09:42 UTC)

3.3.5 Fruit development and seed set

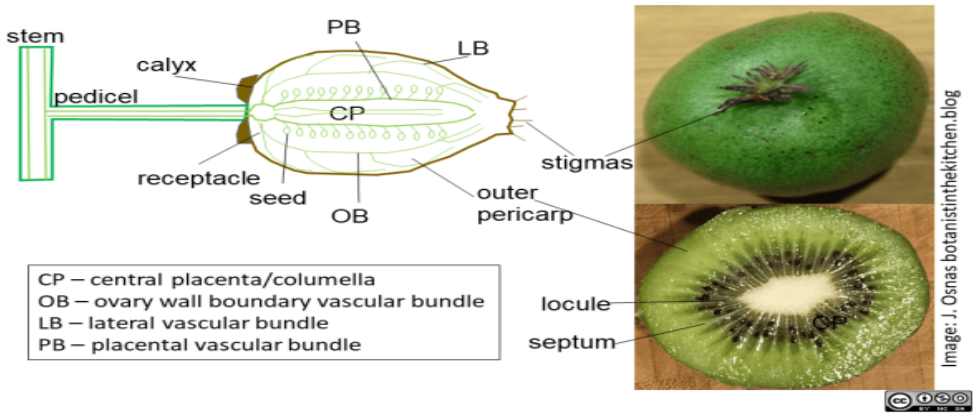
Actinidia deliciosa development started by The development of fruit and seeds in kiwifruit after flowering was studied in detail by Hopping (1976a,b). The growth can be divided into three stages: Stage I (0–58 days after flowering), stage I1 (58–76 days after flowering), and stage I11 (76–160 days after flowering). (Luh & Wang, 1984)

3.3.6 Ovule development

Actinidia is an exile in other words After the Endosperm is finished fertilizing, the plant forms a web of thin-wall cells maintaining the embryo uninucleate. Some important information is that some Hermaphrodite female plants have more fruits which means fewer seeds. As a result, the reproductive system of this plant got outlined. (Harvey & Fraser, 1988)

3.4 Ecophysiology

The Ecophysiology of the Kiwi plant showed information about how it’s leaves at different stages of growth some plantlets had an advantage towards CO_2 emissions meaning that kiwi plants water efficiency was higher than CO_2 in exposed leaves and less in control leaves, the plant also both the outer and inner pericarp cells have plastids containing chlorophyll which give the internal tissue its characteristic green color.



kiwi plant ecophysiology process but from a diagram perspective

Chapter 4: Propagation and Management

4.1 Natural regeneration

Kiwi plant natural regeneration can depend on the type of kiwi plant because there are many types of these plants and each one of them acts differently so basically is just a matter of keeping an eye on the sugar levels as well Prune heavily each spring removing up to 70 percent of the vines.

4.2 Nursery Propagation

Nursery propagation is the process in which people grow new species of plants using a different variety of sources such as seeds. Some examples of nursery propagation include new species like shrubs, fruit trees, and annual flowers.

4.2.1 Propagation from seed

Kiwi plants are usually propagated asexually by grafting fruiting varieties onto rootstock or by rooting kiwi cuttings also sometimes kiwi plants may also be propagated by seed, but the resulting plants are not guaranteed to be true. Even though while kiwi may be propagated by seed, the resulting plants are not guaranteed to have the desirable traits of the parent such as cane growth, fruit shape, or flavor. People can propagate the plant by separating the seeds from damaged ones and having them in areas with equal temperatures. (“Rooting Kiwi Cuttings,” n.d.)

4.2.2 Vegetative propagation

Kiwi plants can be propagated by cutting the root quality of shoots propagated by the cutting method is worse than shoots propagated by grafting and budding methods As a result, a very small number of plants are produced which are relatively negligible against a very huge demand. Seedlings also have vigor and longer roots than cuttings. The cutting method is when you grab the kiwi plant and carefully remove parts of the stem which the plant doesn't need anymore or use. (Actinidia deliciosa, A. Chev.)

4.3 Planting

If people are going to plant more Kiwi plants then they must check that the soil is completely cleared of roots which are greater than 1 inch in diameter; ensure kiwi vines are adequately irrigated but not overwatered, also you gotta make sure that kiwi plants get an equal amount of soil as mentioned before with the water pouring part by making sure those steps are accomplished then you may have a good kiwi plant growth rate. (“Kiwi | Diseases and Pests, Description, Uses, Propagation,” n.d.)

4.4 Management

4.4.1 Tending

In order to tend a Kiwi plant, you must keep the plant well watered also bring putting new soil for the stem to get nutrients basically do as any other person would check a plant but something important about kiwi plants is that you may notice people have special sugar thermometers so the plant doesn’t get overwhelmed with sugar levels that may come from the rain.

4.4.2 Fruiting

Kiwi plants are snapped off as part of the harvesting. The ideal solution would be to have a refractometer, It is capable of measuring sugar content, and for kiwis you want that level to be above 6.5% before it's ready for harvesting, As the fruit ages, it ripens and its sugar content increases too which is a bad thing when you want to have a good harvest of these fruits that's why people need to keep the sugar levels from rising too much because if u let the sugar levels pass then the plant won't have enough time to process all that ("How to Grow Kiwi Plants to Get that Delicious Fruit in 2018!" 2018)

Chapter 5: Actinidia Deliciosa Chain and Uses

5.1 Imports and Export

Kiwi plant total export volume increased at an average annual rate of +1.7% from 2007 until 2018 these means that countries kiwi production are keeping the export level at a stable which benefits other countries who may want to start exporting this fruit. Some countries that have exported and imported are New Zealand (417k tonnes), Italy (289ktonnes), and other countries some imports were made by Spain (221ktonnes) and China (182ktones of kiwi fruit). ("Global Kiwi Fruit Market 2019—New Zealand and Italy are the Leading Exporters of Kiwi Fruits—Global Trade Magazine," n.d.)

5.2 Marketing

CV≥digo vÅm	vÅmbito	CV≥digo v°re	vÅrea	CV≥digo Elen	Elemento	CV≥digo Proc	Producto	CV≥digo aV±o	AV±o	Unidad	Valor
TP	Cultivos y pro	2	AfganistV°n	5610	Importacione	592	Kiwis	2014	2014	toneladas	3587
TP	Cultivos y pro	2	AfganistV°n	5610	Importacione	592	Kiwis	2015	2015	toneladas	8
TP	Cultivos y pro	2	AfganistV°n	5610	Importacione	592	Kiwis	2016	2016	toneladas	4012
TP	Cultivos y pro	2	AfganistV°n	5610	Importacione	592	Kiwis	2017	2017	toneladas	3676
TP	Cultivos y pro	2	AfganistV°n	5622	Importacione	592	Kiwis	2014	2014	1000 US$	2144
TP	Cultivos y pro	2	AfganistV°n	5622	Importacione	592	Kiwis	2015	2015	1000 US$	29
TP	Cultivos y pro	2	AfganistV°n	5622	Importacione	592	Kiwis	2016	2016	1000 US$	1778
TP	Cultivos y pro	2	AfganistV°n	5622	Importacione	592	Kiwis	2017	2017	1000 US$	1761
TP	Cultivos y pro	2	AfganistV°n	5910	Exportacione	592	Kiwis	2015	2015	toneladas	0
TP	Cultivos y pro	2	AfganistV°n	5910	Exportacione	592	Kiwis	2016	2016	toneladas	80
TP	Cultivos y pro	2	AfganistV°n	5910	Exportacione	592	Kiwis	2017	2017	toneladas	50
TP	Cultivos y pro	2	AfganistV°n	5922	Exportacione	592	Kiwis	2015	2015	1000 US$	0
TP	Cultivos y pro	2	AfganistV°n	5922	Exportacione	592	Kiwis	2016	2016	1000 US$	88
TP	Cultivos y pro	2	AfganistV°n	5922	Exportacione	592	Kiwis	2017	2017	1000 US$	27
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1961	1961	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1962	1962	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1963	1963	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1964	1964	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1965	1965	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1966	1966	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1967	1967	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1968	1968	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1969	1969	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1970	1970	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1971	1971	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1972	1972	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1973	1973	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1974	1974	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1975	1975	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1976	1976	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1977	1977	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1978	1978	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1979	1979	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1980	1980	toneladas	
TP	Cultivos y pro	3	Albania	5610	Importacione	592	Kiwis	1981	1981	toneladas	

("FAOSTAT," n.d.)

5.2.1 Packing and Transporting

Kiwi plant packing system is the following people use trucks, railroads and even planes to transport these fruit also the plant needs to be on a controlled air containment so the Kiwifruit are highly impact- and pressure-sensitive and appropriate care must, therefore, be taken during cargo handling, Injury to the fruit rapidly leads to spoilage, in other words, the plant needs to be kept away from moisture and the last kiwi are placed on wood boxes and tightly compress. ("Kiwifruit – Transport Informations Service," n.d.)

5.2.2 Consumer

Consumers when they are recollecting or harvesting kiwi plants they usually focus on certain key factors like the type of soil, water and heat with those factors consumers can see which kiwi fruit is best for gathering or even eating, also sometimes they check if some species of kiwis are good like for people or not and how can they help out if needed.

5.3 Uses

5.3.1 Use 1

Kiwi plants are very good for treating asthma because they have compliments of vitamin C which is very useful to increase your defenses and a study showed that people who eat fresh kiwi fruits or fruits in general help their lung functionality and it's also very good for children. (“Kiwi Benefits,” n.d.)

5.3.2 Use 2

Kiwi plants can also help people control their blood pressure because a study in the year 2014 showed that substances inside the kiwi help lower blood pressures and explains that eating three kiwis a day can lower your levels and make you avoid having heart attacks or strokes. (“Kiwi Benefits,” n.d.)

5.4 Medical Uses

Some medical uses that this plant has are as follows you can use it to help your heart and blood pressure rates you may use it as well for lung respiratory problems this can be useful either for small children and grown-ups of any size

V. Bibliography:

1. 1 Actinidia deliciosa (kiwifruit). (2019, November 20). Retrieved December 6, 2019, from CABI website:
2. Actinidia deliciosa Kiwi Fruit PFAF Plant Database. (n.d.). Retrieved January 17, 2020, from https://pfaf.org/user/plant.aspx?LatinName=Actinidia+deliciosa
3. An Investigation on the Propagation of Kiwifruit (Actinidia deliciosa, A. Chev.) by Grafting under Turkey Ecological Conditions. (n.d.). https://doi.org/10.3923/ijar.2006.597.602
4. https://www.cabi.org/isc/datasheet/7766
5. Evaluación de riego deficitario controlado sobre la producción de kiwi (Actinidia deliciosa). (n.d.). Retrieved January 17, 2020, from http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-31952017000400359&lng=es&nrm=iso&tlng=en
6. FAOSTAT. (n.d.). Retrieved May 4, 2020, from http://www.fao.org/faostat/es/#data/TP
7. Global Kiwi Fruit Market 2019—New Zealand and Italy are the Leading Exporters of Kiwi Fruits—Global Trade Magazine. (n.d.). Retrieved March 20, 2020, from https://www.globaltrademag.com/global-kiwi-fruit-market-2019-new-zealand-and-italy-are-the-leading-exporters-of-kiwi-fruits/
8. Growing Hardy Kiwi Vine In The Garden. (n.d.). Retrieved January 21, 2020, from Gardening Know How website: https://www.gardeningknowhow.com/edible/fruits/kiwi/growing-hardy-kiwi-vine.htm
9. Harvesting Kiwi Fruit: How And When To Harvest Kiwis. (n.d.). Retrieved January 31, 2020, from Gardening Know How website: https://www.gardeningknowhow.com/edible/fruits/kiwi/harvesting-kiwi-fruit.htm
10. Harvey, C. F., & Fraser, L. G. (1988). Floral Biology of Two Species of Actinidia (Actinidiaceae). II. Early Embryology. *Botanical Gazette*, *149*(1), 37–44. Retrieved from JSTOR.
11. How to Grow Kiwi Plants to Get that Delicious Fruit in 2018! (2018, September 15). Retrieved March 4, 2020, from https://contractorquotes.us/grow-kiwi/

Invasive Species Compendium CABI. (2020). Actinidia deliciosa (kiwifruit). Retrieved December 6, 2019, from CABI

website: https://www.cabi.org/isc/datasheet/7766

1. Jignasa. (10:09:42 UTC). *Floral biology of temperate fruit crop*. Education. Retrieved from https://www.slideshare.net/jignasa18/floral-biology-of-temperate-fruit-crop
2. Kiwi | Diseases and Pests, Description, Uses, Propagation. (n.d.). Retrieved March 1, 2020, from https://plantvillage.psu.edu/topics/kiwi/infos
3. Kiwi Benefits: Asthma, Digestion, Vision Loss, and More. (n.d.). Retrieved March 20, 2020, from Healthline website: https://www.healthline.com/health/7-best-things-about-kiwi
4. kiwi fruit seeds—Buscar con Google. (n.d.). Retrieved January 30, 2020, from https://www.google.com/search?q=kiwi+fruit+seeds&sxsrf=ACYBGNQTkwRVwY2X8dY4eCUoLtW3iK-QQQ:1580395510999&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjEmqaIyKvnAhWjo1kKHV_oA74Q_AUoAXoECA0QAw&biw=1440&bih=821#imgrc=6WTsrhod74HxVM:
5. Kiwi Plant Identification: Determining Sex Of Kiwi Vine Plants. (n.d.). Retrieved January 28, 2020, from Gardening Know How website: https://www.gardeningknowhow.com/edible/fruits/kiwi/sex-of-kiwi-plants.htm
6. Kiwifruit – Transport Informations Service. (n.d.). Retrieved March 20, 2020, from https://www.tis-gdv.de/tis_e/ware/obst/kiwi/kiwi-htm/
7. Kiwifruit (Actinidia deliciosa)—Reproduction. (n.d.). Retrieved January 17, 2020, from http://bioweb.uwlax.edu/bio203/s2012/cejka_laur/reproduction.htm
8. Kiwi—Origen y producción. (n.d.). Retrieved September 26, 2019, from https://www.frutas-hortalizas.com/Frutas/Origen-produccion-Kiwi.html
9. Lagos, Luis O., Lama, Waldo, Hirzel, Juan, Souto, Camilo, & Lillo, Mario. (2017). Regulated deficit irrigation evaluation on kiwi (Actinidia deliciosa) production. *Agrociencia*, *51*(4), 359-372. Recuperado en 04 de mayo de 2020, de http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-31952017000400359&lng=es&tlng=en.
10. Luh, B. S., & Wang, Z. (1984). Kiwifruit. In C. O. Chichester, E. M. Mrak, & B. S. Schweigert (Eds.), *Advances in Food Research* (Vol. 29, pp. 279–309). https://doi.org/10.1016/S0065-2628(08)60059-2
11. Pollinating kiwifruit. (n.d.). Retrieved January 31, 2020, from Science Learning Hub website:

https://www.sciencelearn.org.nz/resources/99-pollinating-kiwifruit

12. Rooting Kiwi Cuttings: Tips On Growing Kiwis From Cuttings. (n.d.). Retrieved February 25, 2020, from Gardening Know How website: https://www.gardeningknowhow.com/edible/fruits/kiwi/growing-kiwis-from-cuttings.htm
13. Saliyan, T., B, M., & S., S. (2017). A Review on Actinidia deliciosa. *International Journal of Pharma And Chemical Research*, *3*, 103–108.
14. seeding kiwi fruit—Buscar con Google. (n.d.). Retrieved January 30, 2020, from https://www.google.com/search?q=seeding+kiwi+fruit&sxsrf=ACYBGNQOLhHuglymN21LlUmTjMDT0LDzkA:1580393288309&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjk_Lfkv6vnAhVIjlkKHWJTAsoQ_AUoAXoECAwQAw&biw=1440&bih=732#imgrc=598nO9ULuxCv_M:
15. *https://scialert.net/abstract/?doi=pjbs.2007.1180.1184*