Citrullus lanatus (Thunb.) Matsum. & Nakai

Monograph - Agricultural science

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Chapter 1 Introduction

Within this document you will learn the full extent of *Citrullus lanatus* aka watermelon. In the next chapter you will read all information relating to *Citrullus lanatus* Ecology, this includes its geographical origin. Current world distribution of the fruit and seeds, as well as the perfect growing conditions. As well as its classification in the world of plants. In chapter 3 there is information on watermelons strange and complex chromosomes and how it affects reproduction. As well as the full indepth life cycle of the plant and what pests diseases are a threat to the survival of the plant.

Chapter 2 Ecology

2.1 Distributional context

2.1.1 Origin

The origin of *Citrullus lanatus* has been estimated to be both the Kalahari and Sahara deserts but the discovery of several 5000-year old wild watermelon seeds at an archaeological site in Uan Muhuggiag in southwest Libya confirms the origin of watermelon and places it in ancient Africa (Wysylkowa & Van der Veen, 2004).

Based on historical records and indigenous names for watermelon, the Egyptians and Berbers were some of the first to cultivate and eat watermelons(Chomicki & Renner, 2015).

In March 2016 Archaeologists found ancient Egyptian hieroglyphs that were believed to show the first watermelon harvest, occurring at least 5,000 years ago.(Strauss, August 21, & 2015)

2.1.2 Present distribution

The status of traditional watermelon cultivation and on-farm conservation in Zimbabwe is insufficiently documented. Limited information also exists on the diversity of watermelon to the extent of its distribution in Zimbabwe.("Watermelon - Citrullus lanatus - Encyclopedia of Life," n.d.) With increasing commercial production of sweet watermelons from neighbouring countries in particular South Africa more watermelons are being exported to to the U.S. and Europe.("http, poweo n.d.)

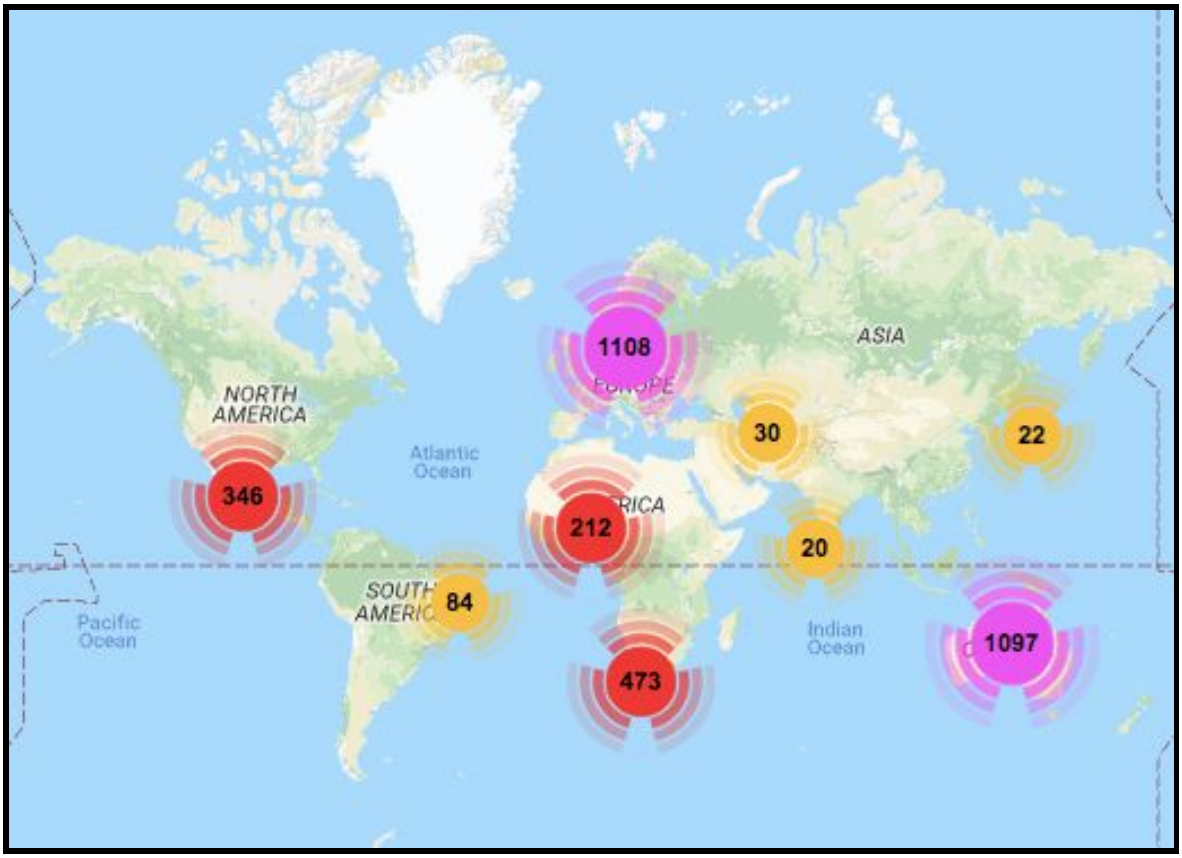

Figure 1: Major watermelon growing regions 2016, modified from Encyclopedia of Life. (http://eol.org/pages/584423/maps)

2.2 Favorable environment

2.2.1 Elevation

While watermelon can be grown at all types of elevation, farmers find that anywhere between 7 and 150 meters above sea level watermelons is best for optimal growth (Strauss, August 21, & 2015, 2015). The best location was 77 meters above sea level where crops grow faster and larger. (Strauss, August 21, & 2015, 2015)

2.2.2 Climate

Watermelons require long, warm growing periods. Watermelons are very susceptible to frost during the cold season. Ideal environments include desert, tropical and most non-marine locations. ("Growing Watermelons," n.d.). They thrive in both humid and semi-arid environments. Most of africa has the perfect climate to grow the largest watermelons and tastiest watermelons. Due to the constant sunshine hitting its vines and roots. ("Growing Watermelons," n.d.)

2.2.3 Geology

Watermelons can be grown on a wide range of soil types but prefer soils with a ph between 6 and 6.8. Planting in heavy soils is recommended in order to minimise plant losses from something known "root rot" (Gc et al., 2014). Watermelons grow best in fertile, sandy loam soils mixed together with moist fertilizer, in order to avoid the soils turning to sandy or even clay like, for these soils will stunt the plants growth. Although the watermelon's deep root system makes it relatively drought-tolerant, the plant requires an abundance of water to produce healthy fruit(Gc et al., 2014). Keep the soil consistently moist from planting until harvest will optimize melon size and taste, so crops should be planted in rainy or preferably foggy areas. (Gc et al., 2014)

2.2.4 Rain fall

Much like cacti, watermelons have large and long roots that search the soil for water. Watermelons are considered to most as “water hungry plants” but in all actuality due to their long roots that spread out for meaters too much rainfall can become harmful to the plant (Gc et al., 2014). Farmers have concluded that plants given more than 1 liter of water a day have a greater chance of swelling, rotting or in extreme cases bursting.(“How Much Water Is In a Watermelon?,” n.d.)

2.3 Classification

The watermelons Binomial name is: Citrullus lanatus. Its classification is kingdom: Plante. Order: Cucurbitales. Family: Cucurbitaceae. Genus: Citrullus. Species: lanatus (google)

2.4 Interaction with other plants

There is very limited data on how watermelon interacts with other plants, however, it is known that interspecies competition, seen when watermelon is grown at high density, can affect fruit size and form (tandfonline)

CHAPTER 3 BIOLOGY

3.1 Chromosome complement

Within *Citrullus lanatus* groups of chromosomes come in multiples of 11. The standard number of chromosomes in watermelon is 22. This is known as a diploid number (di meaning two). With this even number, cell division happens rapidly and frequently. Pollen and egg cells contain 11 chromosomes that recombine to produce seed with the usual 22 chromosomes. Through a chemical process, the chromosome number can be doubled to a 44 tetraploid (tetra meaning four). Cell division in plants with 44 chromosomes is, again, highly regular and will produce pollen and egg cells with 22 chromosomes instead of the regular 11, and they recombine to produce, seed having 44 chromosomes. However, if pollen from a plant with 22 chromosomes is placed on a female flower of a plant with 44 chromosomes, the resulting seed will have 33 chromosomes (triploid – meaning three). This odd number does not produce any form of viable offspring: that is pollen and eggs that are sterile in the resulting seedlings.The triploid seeds develops into a sterile plant that cannot produce seed, much like a mule in the animal kingdom cannot reproduce. (Old Farmer's Almanac)

3.2 Life cycle

The life cycle of *Citrullus lanatus* is divided into four parts. Part 1 is germination, and occurs when seeds are placed in the soil. When soil temperatures exceed 65 degrees Fahrenheit (18 Celsius), bury the seed at a depth of about 2 inches (5 cm). Once planted and watered, the seed sends out a stem, or hypocotyl and a radicle. In three to twelve days, the hypocotyl pushes out the first two leaves. When germination is completed part 2 begins, Vining. Vining is when the plant begins to grow long stems and leaves. (during this time the roots of the plant are very weak and fragile) thirdly the flowering process begins, once the vines of the plant are established *Citrullus lanatus* blooms both a male and female flowers. Watermelon flowers last usually about a day or 2 which means that there must be bees near the growing area in order to ensure pollination of the plant. (if no bees are present pollination can be done manually) The final stage of life for the *Citrullus lanatus* is known as Fruiting. Once pollinated, female watermelon flowers begin to produce fruit. Tiny green balls begin to swell beneath the blossoms. Once the watermelon plants begin to fruit, provide at least one inch of water per week until harvest. Depending on the watermelon variety, the fruit takes up to one month to fully mature. (academic.oup.com)

3.3 Pests and diseases.

Due to the hard outer shells of watermelons it is considered very tough for pests and diseases to enter the fruit itself. But the leaves and stems are very open to diseases, especially *Anthracnose.* This seed-borne fungus is hard to detect initially, as it may only appear as small spots on plants

stems and leaves. these spots expand as the plant grows, turning black or gray over time. (PubMed)

Crop rotation along with aggressive neem oil treatment will help preserve future harvest but unfortunately if your plant has been exposed to Anthracnose, the fruit has been spoiled and is not recommended to consume for health reasons. (PubMed)

Chapter 4 PROPAGATION

4.1 Planting

It is recommended to plant your seeds in warm to hot soils (daytime) in order to avoid poor germination of the seeds.Watermelon seed germinates easily and quickly, within a few days. Watermelon plants outgrow the seedling stage very quickly Most watermelon farms are located on large hills, this is so farmers can save room on watermelon spacing. When on a flat surface watermelons must be growing 7 to 8 feet apart to reach their full potential, while on slanted hills they can be grown as close as 2 feet apart. When initially planted ensure that the surrounding area is welly fertilized and the soil is moist, to ensure a speedy growth. (Bonnie Plants)

4.2 Management

Watermelons have very shallow roots and they need lots of moisture. The soil should never dry out with; mulch helps with this (as well as assisting with weed control). The key stages regarding watering for watermelons are during the beginning stages and especially when close to full maturity: during these stages they should be regularly watered (once to twice a day). As well as requiring high levels of water watermelons are also very hungry plants that require the regular addition of nutrients through the addition of manure or other organic fertilizers, for the best results. (Bonnie Plants)

Due to a watermelons hard outer shell protecting the fruit from the outside world it is hard to know exactly when is ripe but over time you will get better with practice. The first sign to

look for is the curly tendril at the stem. When this curly stem begins to dry out it is an indicator that your plant will soon be ready for harvest. The most popular way the test your fruits ripeness is by the appearance of a light coloured patch on the bottom of the fruit. It is initially green, but as the melon ripens the green mark fades and it becomes yellowish, lead by the skin overall becomes duller and tougher. (Bonnie Plants)

Chapter 5 Marketing

5.2 Products

Watermelon can be used in a multitude of products, especially self care products. This includes, lipsticks, lotions, shampoo and more(Ufoegbune et al, 2014). Besides these watermelon is mostly used for consumption. Alone or mixed with other soft fruits to make a nice salad. Watermelons are also used in bartending for daqories and other tropical drinks where watermelon are the main ingredient or even just for a bit extra flavor(Ufoegbune et al, 2014).

5.1 Exports

In 2016 the World trade in watermelon was over 1 billion USD. This was 25% more than in 2012 and a 10% increase from 2015. European countries accounted for the highest dollar worth of exported watermelons during 2016 with shipments valued at $643.1 million or 44.1% of global exports. In second place were North American exporters at 34.7% while 9.1% of worldwide watermelon shipments originated from Asia. Latin America (excluding Mexico) and Caribbean shippers shipped 7.3% worth of watermelons followed by African exporters at 4.3% and Oceania at 0.4%(Ufoegbune et al, 2014).

Table 2 (top world exports of watermelon by country)

1.	Mexico	US$380.9 million	26.2%
2.	Spain	$369.5 million	25.4%
3.	United States	$123.2 million	8.5%
4.	Italy	$84.8 million	5.8%
5.	Netherlands	$57.2 million	3.9%
6.	Greece	$49 million	3.4%
7.	Morocco	$34.8 million	2.4%
8.	Vietnam	$32.1 million	2.2%
9.	Brazil	$31.5 million	2.2%
10.	China	$26 million	1.8%

5.2 Drinks

Watermelon rind ingredients to plump up and hydrate your skin without feeling heavy. It's light and refreshing, just like a **slice** of watermelon on a hot day. Korean beauty brands are often ahead of the curve with their product ingredients(Ufoegbune et al, 2014).

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