

Kinmen four seasons represent actual observations of fruits

Students :

1. Liu, Cheng-Yang 2.Li, Yu-Zheng 3.Yeh, Chien-Jui
4.Lin, Yu-Shan 5.Huang, Jia-Ying 6.Hsu, Hsin-Yin

Teacher :

Lee, Yu-Hsien



Summary:

The weather in Kinmen changes rapidly in four seasons: spring is rainy and foggy; summer is the main rainy season with the predominance of the southwest monsoon and sometimes typhoons; winter is the strong northeast monsoon, extremely dry and cold; and the climatic characteristics of the four seasons make Kinmen suitable for fruit growing in all seasons.

Research purposes:

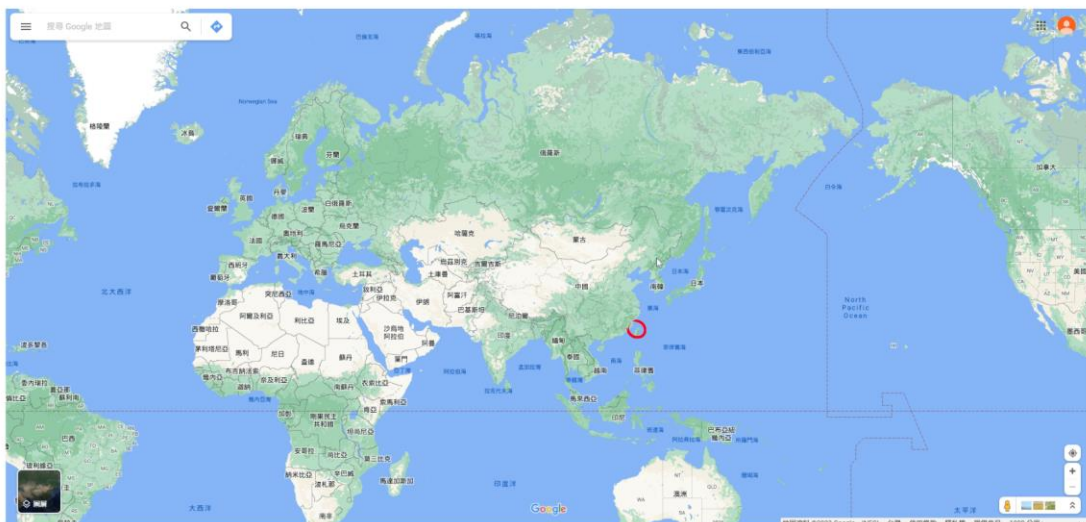
We, who were born and raised in Kinmen, often hear elders say that the fruit in Kinmen is more watery, or sometimes hear grandfather complain that t

he typhoon has ruined all his hard work, and sometimes laugh from ear to ear because of the bumper harvest. So we were motivated to study the fruits, what factors make Kinmen able to grow distinctive fruits, and select a variety of fruits in spring, summer, autumn and winter to observe and find out the changes and characteristics of their growth.

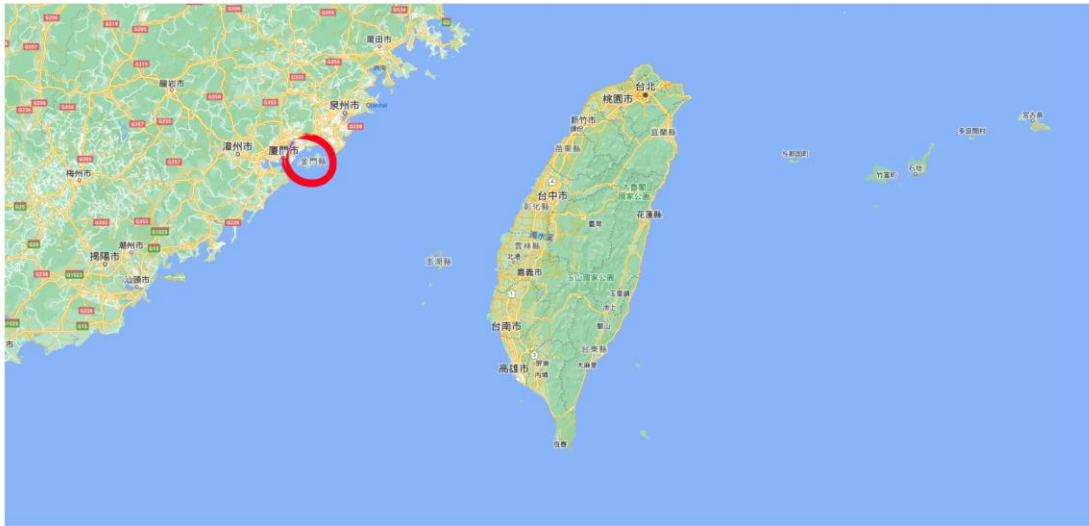
Research methods:

Our team members regularly photographed the fruit and observed its growth, and searched online for data on Kinmen's temperature, sunshine hours, humidity, wind length and other data in 2022 to see if these factors correlated with the fruit results.

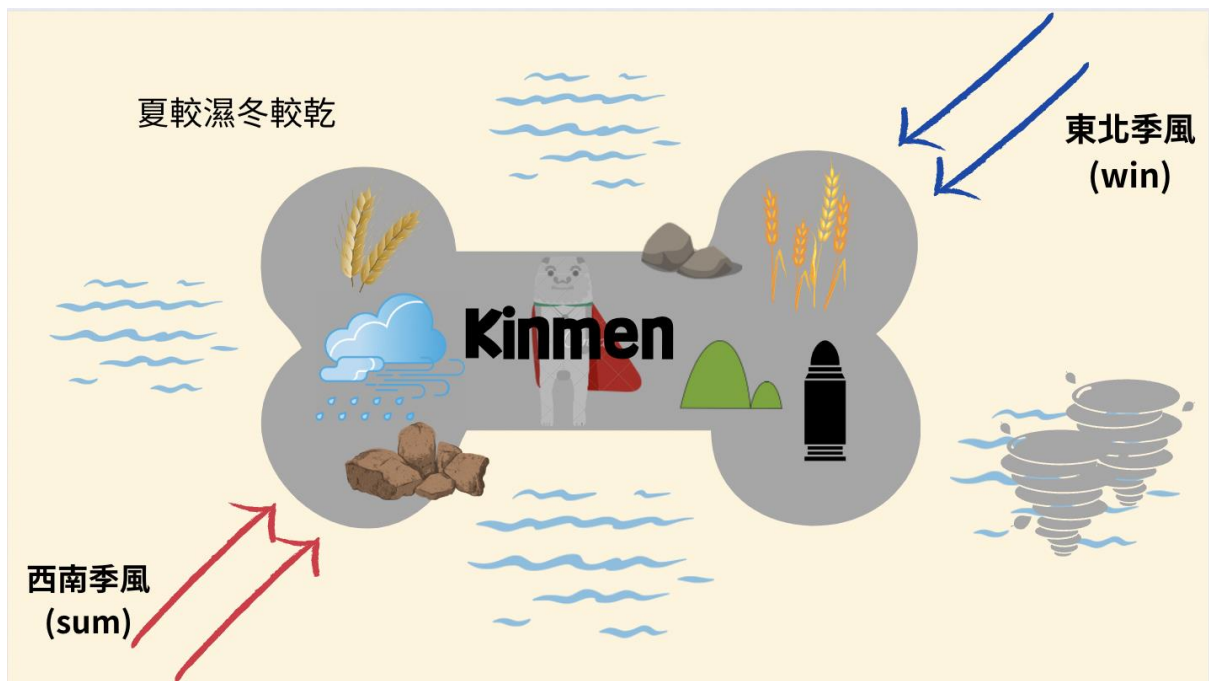
Geographical Locations:



Asia



Taiwan



Kinmen

Discussion:

Kinmen Monthly Sunshine Hours Statistics Table for 2022

month	1/1	2/1	3/1	4/1	5/1	6/1	7/1	8/1	9/1	10/1	11/1	12/1
sunrise	6:50	6:48	6:28	5:58	5:31	5:17	5:21	5:34	5:47	5:58	6:13	6:33
sunset	17:29	17:51	18:08	18:22	18:35	18:50	18:59	18:50	18:25	17:54	17:27	17:17
sunshine hours	10hr 39min	11hr 3min	11hr 39min	12hr 24min	13hr 4min	13hr 33min	13hr 37min	13hr 15min	12hr 37min	11hr 55min	11hr 13min	10hr 44min
total sunshine hours	145.2	91.6	170.4	190.5	93.6	116.9	286.5	307.6	226.6	175.7	132.7	137.5

As can be seen from the graph, the closer to summer the longer the sunshine hours, with the longest in July and the shortest in January.

1. And we know that plants cannot survive without light, and the longer the sun shines, the more sugar there is in the fruit, because in photosynthesis, plants use the energy of sunlight to convert carbon dioxide into carbohydrates, i.e. sugar.

2. Plants can be divided into two categories according to the length of the sunshine:

-Long day plants: light hours: 14~17 hours, the longer the light, the earlier the flowering, and most of them are found at latitudes above 60 degrees.

-Short-day plants: light hours are 8-12 hours, the longer the dark period, the shorter the flowering period. Many plants native to tropical, subtropical and temperate regions that flower in spring and autumn fall into this category.

Kinmen's average temperature in 2022

month	1	2	3	4	5	6	7	8	9	10	11	12
highest	17°C	17°C	19°C	23°C	27°C	30°C	32°C	32°C	31°C	28°C	24°C	20°C
average	14°C	14°C	16°C	19°C	23°C	27°C	29°C	29°C	28°C	24°C	20°C	16°C
lowest	11°C	11°C	13°C	17°C	21°C	25°C	26°C	26°C	25°C	21°C	17°C	13°C

1. Summer: Temperatures can reach around 30 degrees, and tropical fruits with a short growing season can be grown.
2. Winter: The temperature can reach about 10 degrees and temperate fruits can be grown.
3. Overall, the temperature in Kinmen is between 10 and 30 degrees, because the winter is cool and the summer is hot, so many fruits suitable for different environments can be grown.

Rainfall in Kinmen in 2022

month	1	2	3	4	5	6	7	8	9	10	11	12
rainfall (mm)	47.5	179.5	102.0	18.0	214.5	184.5	120.0	34.0	31.0	0	47.5	19.0

1. Heavy rainfall: The proportion of precipitation from February to July is high in Kinmen, but the precipitation in April is very low, and for fruits that need water in spring, there will be a dry period.

2. Low precipitation: The rainfall from August to January is low, and there is no rain fall in October, so Kinmen will be very dry in autumn, and many fruits that need water will not even be able to grow.

3. The main rainfall period in Kinmen is the rainfall brought by typhoons in May, June and July and August of the rainy season, although this year because fewer typhoons pass through Kinmen, but the rainfall has increased year by year compared with previous years, and in recent years, June and August rainfall is more, July is much less, but this year there is a stabilization.

Introduction to Kinmen:

The climate: Although the geographical location of Kinmen is similar to the latitude of the central region of Taiwan, the average temperature of the four seasons is lower, relatively speaking, Kinmen has four distinct seasons, mainly affected by the northeast monsoon and southwest monsoon, the winter is relatively dry, the summer is relatively humid, because surrounded by the sea and the ocean regulates the climate, the temperature of Kinmen does not change much, and the average temperature of the whole year is about 20°C. In addition, Kinmen is often affected by typhoons and the rainy season, which can bring strong storms and rain to a certain extent, and the rainy season is often rainy, which is the main precipitation period in Kinmen.

The terrain: The whole island is like a bone, the terrain is flat, mainly divided into three parts:

a. Hilly area: accounting for about 77% of the total area of Kinmen, it is the main landform of Kinmen, mainly small hills at an altitude of 100-150 metres, including the famous Taiwu Mountain.

b. Plain area: mainly distributed in the eastern half of the island, accounting for about 15% of the total area of Kinmen. The plain area has fertile land and abundant water resources, and is an important agricultural area in Kinmen.

c. Rocky coastal area: accounting for about 8% of the total area of Kinmen, mainly distributed along the coastline, composed of granite, limestone and other rocks.

Fruits in Kinmen

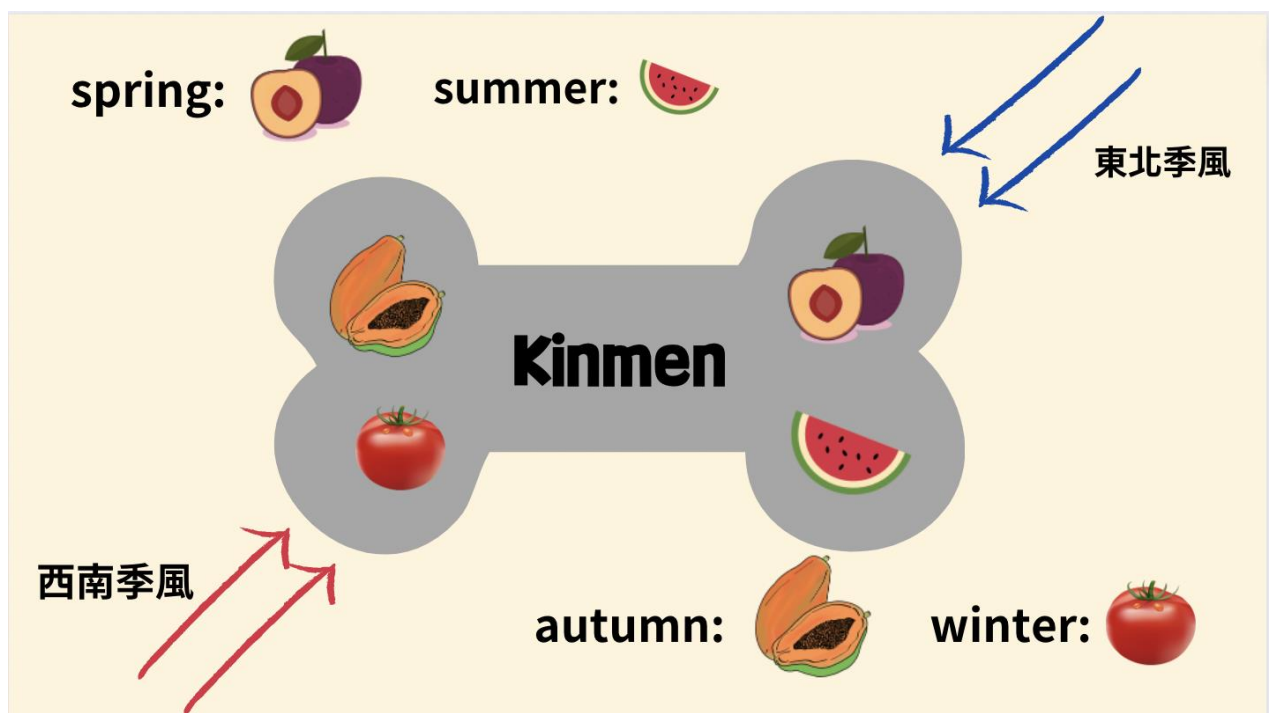
We made four types of fruits:

Spring: Plums

Summer: Watermelon

Autumn: Papaya

Winter: Tomatoes



Papaya

Scientific name: *Carica papaya*

Growing season: September~November planting, May~September harvesting (Kinmen season)

Suitable temperature for growth and development: 21°C~33°C

Growth environment: Full sun, no drought, no strong wind

Origin: Tropical America

Present situation in Kinmen: In 2022, there were fewer typhoons hitting Kinmen than before, so the rainy season was the main source of rainfall in Kinmen in 2022, and the rest of the rainfall was less stable, with almost no rainfall in October and December. As can be seen from the picture, the leaves become relatively dry in October, and recover slightly in November, and there is almost no rainfall in December, and it can be seen that the leaves have become significantly dry, and at this time it is also the time when the papaya is ripe and fruitful, the leaves transport nutrients to the fruit, and the leaves begin to turn yellow and fall off, so because of the lack of rainfall, the papaya does not grow as well as expected.



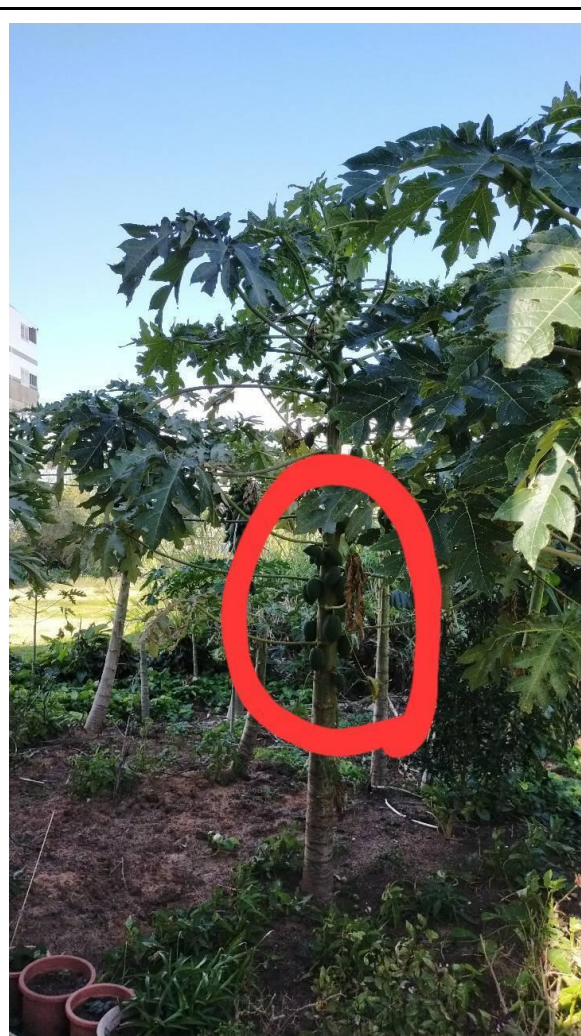
2022/9/25



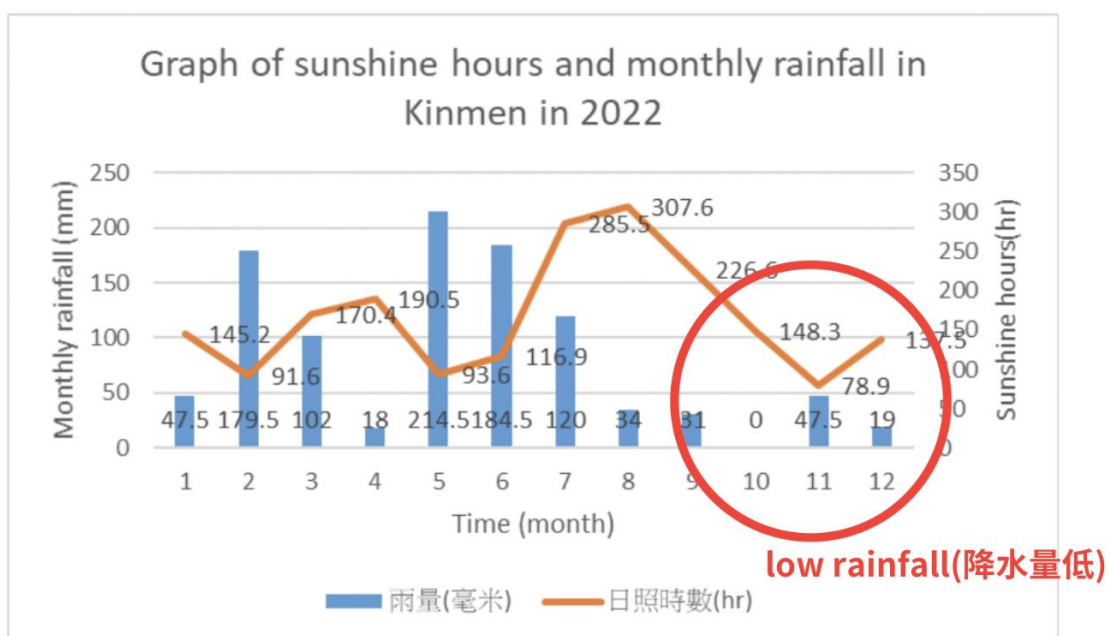
2022/10/30



2022/11/27



2022/12/25



Tomato

Scientific name: *Lyopersicum esculentum* Mill

Growing season: Suitable for autumn sowing, winter harvest

Suitable temperature for growth and development 15°C–25°C

Growth environment: Stable temperature, well-drained soil and sufficient sunlight

Country of origin: Peru, Ecuador and Bolivia in South America

Current situation in Kinmen:

Tomatoes are planted from September and can be harvested as early as December, with the harvest period extending into April or May. Traditionally, however, all the tomatoes are harvested by the end of March.

Temperature is closely linked to tomato growth. They need a stable temperature to grow well, and both high and low temperatures can affect their growth. In Kinmen, the temperature gradually decreases from September and reaches its lowest point in December, with a temperature range of about 29°C~15°C, a difference of about 14°C. The temperature is suitable for tomato growth during the growing season, but during the fruiting season, the cold weather slows down the time required for fruiting. As the tomato fruiting period coincides with the winter season in Kinmen, the expected harvest time is delayed.



2022/10/16



2022/10/31 bloom



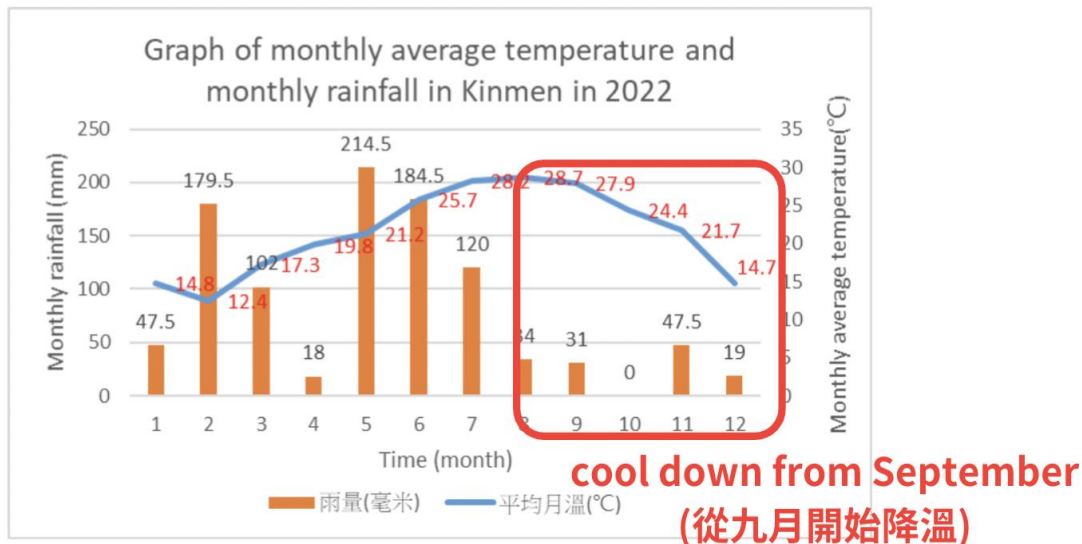
2022/11/16 fruit growth



2022/11/29



2022/12/18 color change



Plum

Scientific name: *Prunus*

Growing season: February ~ June (refers to the flowering to fruiting period)

Suitable growth and development temperature: no temperature requirements

Growth environment: the climate should not be too dry and humid

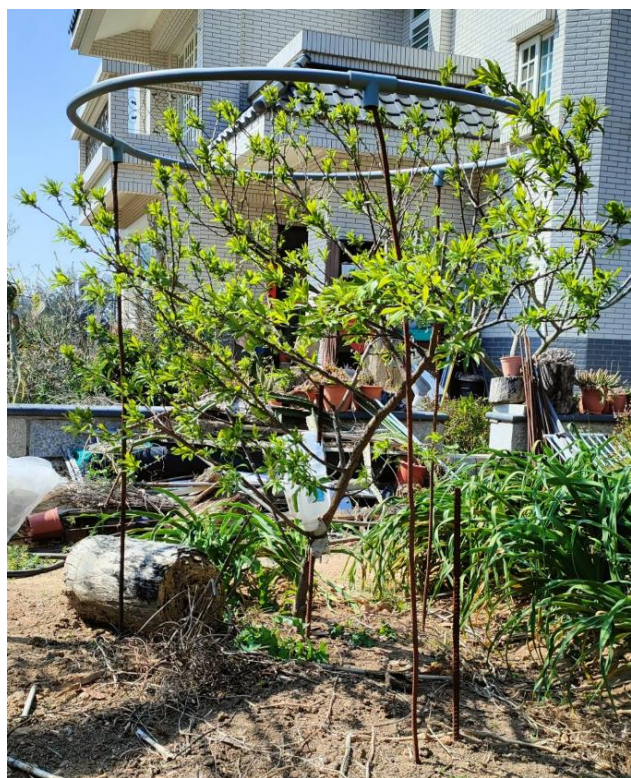
Country of origin: China

Current situation in Kinmen:

The soil conditions in Kinmen are not very good, so strengthening soil improvement and improving fertiliser and water management before planting can help improve the quality and yield of the fruit.

Rainfall is one of the most important factors affecting the flowering and fruiting of plums. In the Kinmen region, February to July is the main rainy season. However, there is less rainfall in the Kinmen area in April, which can affect the time it takes for the plum fruit to ripen. In addition to rainfall, light is also an important factor in plum growth. Although plums are not very sensitive to light, if there is enough light, the colouring of the fruit will be better.

flowering period :



2022/2/20



2022/3/5 bloom

fruiting period :



2022/4/13



2022/5/18 fruit growth



2022/6/3 color become deeper

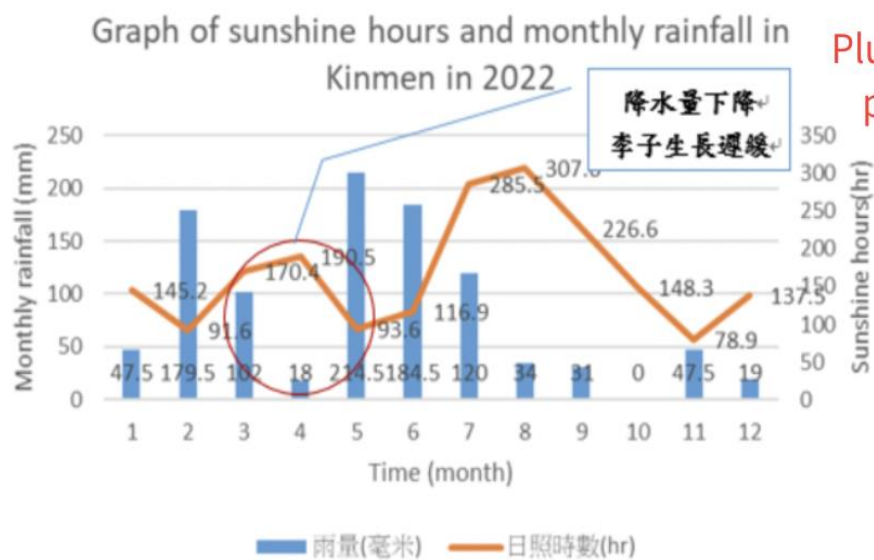
mature period :



2022/6/10 gradually turning red



2022/6/16 ripe fruit



Plum growth slows as precipitation falls

Watermelon

Scientific name: *Citrullus vulgaris* Shard

Growing season: Watermelon can be planted all year round, but summer is best.

Suitable growth and development temperature: 25°C~35°C

Growth environment: Large temperature difference between day and night, long sunshine time, good drainage

Country of origin: Africa

Current situation in Kinmen:

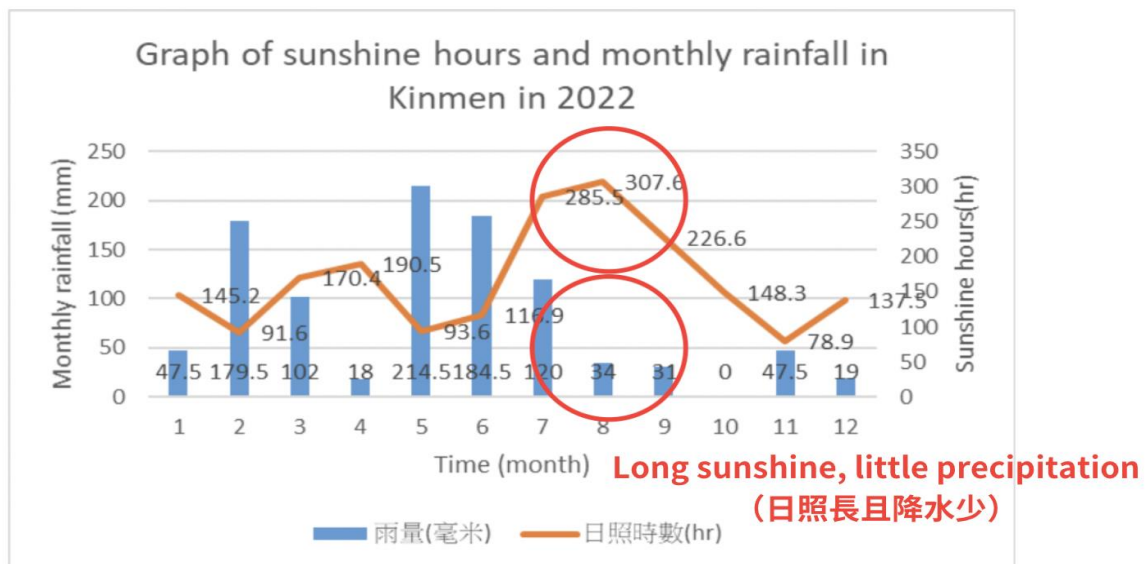
Produced from July to September every year, irrigation should be reduced before flowering and fruiting, otherwise it is easy to cause split fruit.

Because the time of observation does not match the watermelon growing season, so the photo cannot be observed, but through the rainfall, temperature, sunshine time to speculate, watermelon is suitable for growing in summer and the sunshine is long, the rainfall can not be too much and the drainage should be good, In Kinmen, the summer is from June to August, the month with the longest sunshine is from May to August, and this year because there is no typhoon invasion, so the rainfall from June to August is decreasing, so we infer that watermelon can grow best in August.

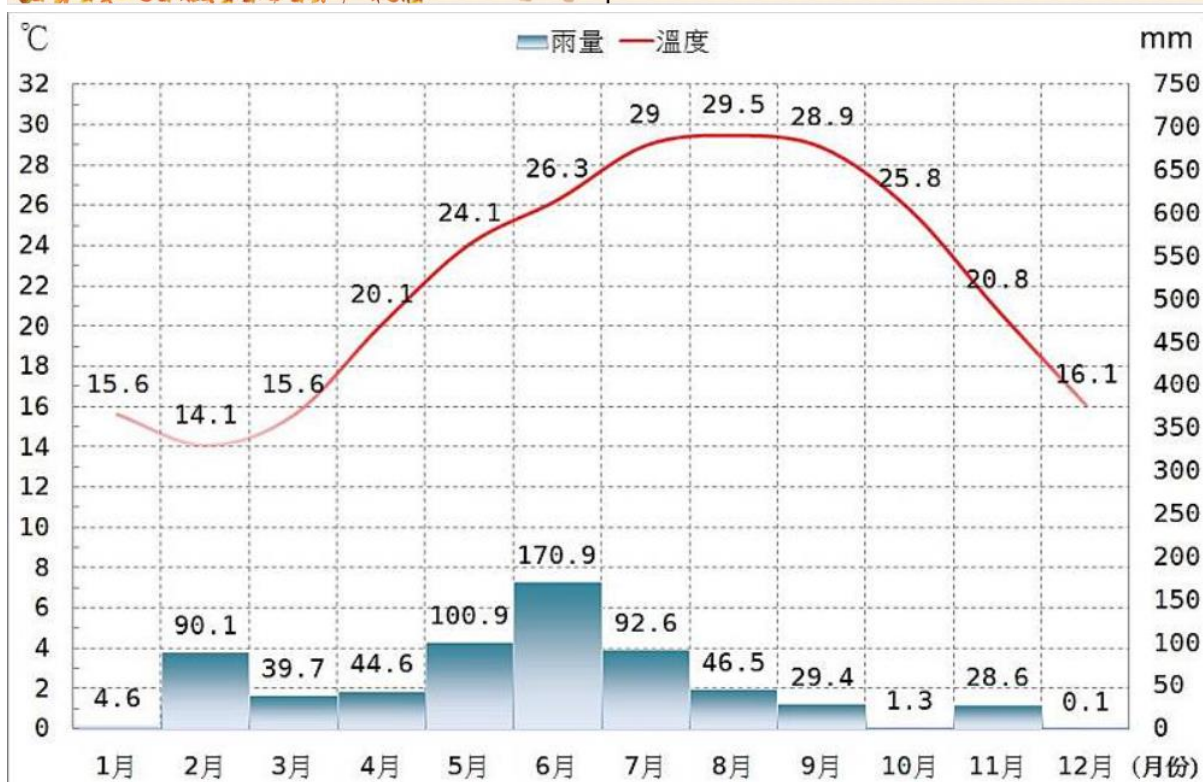
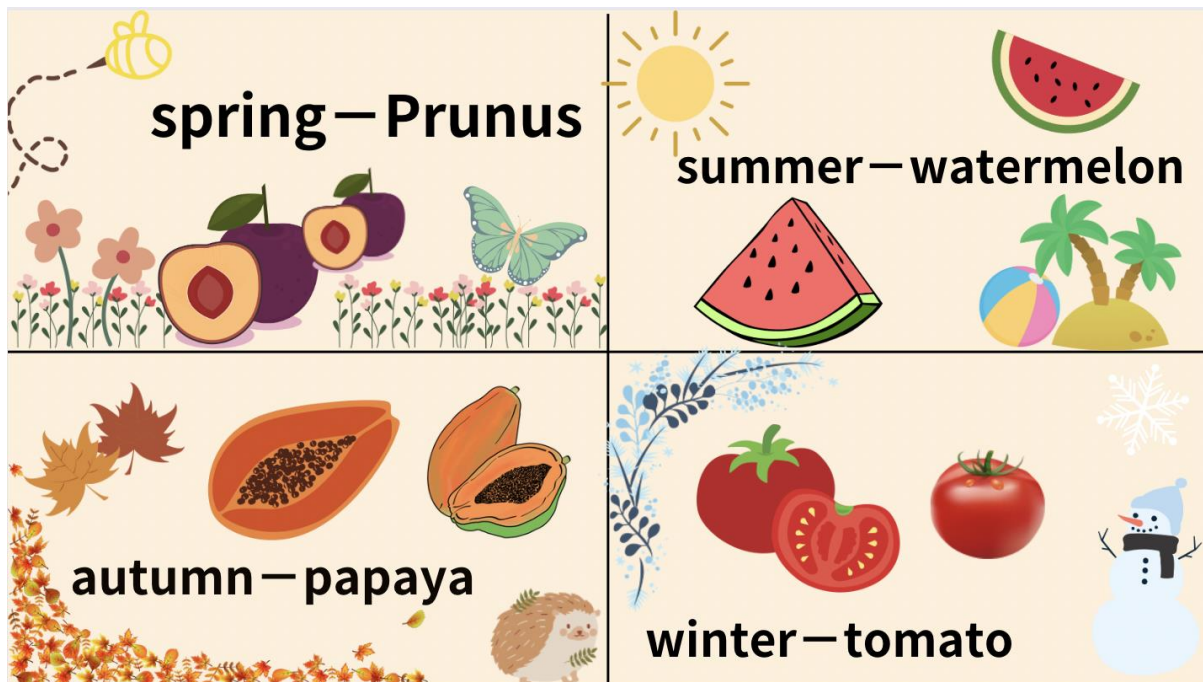


<https://www.dadu.taichung.gov.tw/980667/980668/980670/980674/1929185/>

Quoted from the website of the Agricultural Products Bureau of the Dadu District of Taichung City



Conclusion



As rainfall, temperature and sunshine are the main factors affecting fruit growth, we compare the relationship between fruit and these factors using the relationship between rainfall and temperature and the relationship between rainfall and sunshine hours.

Plum:

Rainfall in Kinmen is a key factor, and excessive drought or wetness is not conducive to plant growth. February to July is the rainy season in Kinmen, while the total rainfall in Kinmen is lower than in other areas, plums are less affected by temperature, and sufficient sunshine hours are beneficial to skin colour, so spring in Kinmen is in line with the environment in which it grows.

Watermelon:

As watermelons do not tolerate excessive humidity and rainy weather, it is ideal to choose to cultivate watermelons around August, when the summer sunshine time in Kinmen is the longest, when there is less rainfall, the climate is drier, and can provide sufficient sunlight and low humidity environment, which is conducive to the growth and quality of watermelons. Therefore, the summer in Kinmen is more in line with the growing season.

Papaya:

The rainfall from October to December 2022 is the lowest in the year, papaya is not tolerant to drought, and this period is the growing season of papaya, resulting in some leaves withering yellow and not growing very full; the suitable growing temperature of papaya is 21°C~33°C, and the average monthly temperature in November and December is lower than this range, resulting in some yellowish leaves and not growing very full.

Tomato:

- a. Tomatoes prefer good soil drainage but are not tolerant of high temperatures and prolonged heavy rainfall.
- b. Tomatoes are warm loving plants and the suitable temperature for growth is 19°C-24°C.
- c. If the temperature is too low, the growth rate of tomatoes slows down and there is no resistance to frost damage.
- d. If the temperature exceeds 30°C, the growth and development of tomatoes will be affected, and the fruit will also be prone to problems such as poor colouring.

Because of the relatively heavy spring rainfall in Kinmen, the soil may have drainage problems, and the climate in Kinmen is a subtropical monsoon climate, with hot and humid summers and colder winters. As a result, tomatoes grow in autumn and bear plump fruit in winter.

References

1. Watermelon – Agricultural Knowledge Portal

(https://kmweb.coa.gov.tw/theme_data.php?theme=production_map&id=26)

2. Precautions for Plum Flowering – Agricultural Knowledge Portal

(https://kmweb.coa.gov.tw/knowledge_view.php?id=8428)

3. What are the conditions for papaya planting– Agricultural Knowledge Portal

(https://kmweb.coa.gov.tw/knowledge_view.php?id=94)

4. Organic Tomato Cultivation Techniques–Tomato Theme Pavilion–Agricultural Knowledge Portal

(<https://kmweb.coa.gov.tw/subject/subject.php?id=32641>)

5. Central Meteorological Bureau of the Ministry of Communications

(<https://www.cwb.gov.tw/V8/C/>)

6. Wikipedia

(<https://zh.wikipedia.org/wiki/Wikipedia>)