

Executive Summary

This report successfully looked at the status of garlic in China, the largest garlic producers and exporters in the world. The report particularly discussed the gastronomy of garlic in the country looking through the mirror of the social, economical, political, technological, and environmental factors that grossly impact the production, consumption and export of garlic in China. The conclusion of the report briefly discussed the synergistic and antagonistic nature of all these factors which will Ultimately help to better understand the status of garlic in China, what has made the spice appreciated in the country, possible projection about the future of the spice in the country and possible effect that garlic might have on the overall situation of the country China.

Table of Contents

Introduction.	3
Gastronomy of Garlic in China.	6
• Social Context	8
• Political Context.	9
• Economic Context.	10
• Technological Context.	11
• Environmental Context.	11
Conclusion.	13
References.	14

Introduction

Garlic, known scientifically as *Allium sativum*, grows as a small bulb under the ground. It belongs to the plant family Alliaceae¹. Because it has pungent smell, it earned the name “stinking rose”. Its cultivation dates back to many centuries ago, before the beginning of the cultivation of any other herb known to man today, and associated with Asian ancestry (Fenwick and Hanley, 1985).. The whole physical form of garlic is regarded as a knob. But the individual part is known as the garlic clove. Some of the nutrients contained in Garlic include protein, calcium, polyphenols, magnesium among many others (Cardelle et al, 2010).



Fig 1. Garlic

Source: www.bbcgoodfood.com

There are different varieties of garlic and many of them have had to be renamed at different times by different growers. Garlic has its origin in *Allium longicuspis* (Cardelle et al, 2010). We have the “field garlic”, the “wild garlic”, and the “crow garlic” of British descent which are known to belong to the *Allium oleraceum*, *Allium ursinum*, and *Allium vineale* species respectively. The species *Allium vineale* and *Allium canadense* which are also commonly called the “meadow garlic” or the “wild onion” are often seen as weeds in Northern America. Another variety of garlic is the “Elephant garlic” which among the best varieties of garlic to exist. Furthermore, we have another

variety known as the “single clove garlic” which came from Yunnan, in China. Several of these varieties have their names derived from places of cultivation and even their wrapper color. Example of these include ‘Oregon Blue’ garlic, ‘Chinese Pink’ garlic, ‘Chesnok Red’ garlic, and the ‘Spanish Roja’ garlic. In the United States, there are three main varieties that are available- the “American garlic”, the “Italian garlic” and the “Mexican garlic”. All of these show how diverse garlic is, and the variations are the consequences of centuries of mutations. However, despite all the different varieties, garlics are largely grouped as either hard neck or soft neck.

Variety	Height (ft)	Scape	Coiling before straightening	Bulbils	Bulbs	Clove skin	Double clove	Storage (months)	Typical named selection
Rocambole	3- 4	Uncurled	2-3 times	Numerous and purple in color	Off-white Purple streak	Brownish and easy to peel	Prone to double clove	4-5	German Red, German Brown, Spanish Roja, Russian Red, Killarney Red, Montana Giant
Purple Stripe	3-5	Uncurled	Forms downward U	Numerous and purple in color	Purple streak Contain 8-12 cloves	Brownish and difficult to peel	Rarely occur	5-7	Chesnok Red, Persian Star
Glazed Purple Stripe	3-5	Uncurled	Full coil	Numerous and intensely purple in color	Purple streak Contain 8-12 cloves	Brownish and difficult to peel	Rarely occur	5-7	Purple Glazer, Red Rezan
Marbled Purple Stripe	3-5	Uncurled	Random coils	Numerous and purple in color	Purple stripes 4-7 cloves	Brownish	Rarely occur	5-7	Siberian, Brown Tempest, Krasnodar Red
Porcelain	4-6	Uncurled	Loose and random coils	Numerous, small, white color	4-6cloves	Difficult to peel	Rarely occur	5-7	Romanian Red, Georgian Crystal, Music, Polish Hardneck, Zemo, Georgian Fire, Northern White, German White, Krasnodar White
Artichoke	-----	-----	-----	Purple	Whitish to purple blush 12-20 cloves	Difficult to peel	-----	6-9	Inchellium Red, California Early, Susanville, California Late, Early Red Italian, Machashi, Red Toch
Asiatic	3	-----	No curling	Dark purple and larger	4-8 cloves	Difficult to peel	Present	5-7	Asian Tempest, Japanese, Wonha, Sakura, Pyong Vang
Turban	-----	Weak	Downward U	Numerous, purple and small	Dark purple, 7-11 cloves	Brownish Easy to peel	Not present	3-5	Red Janice, Blossom, Xian, Tzan, Chinese Stripe
Creole (warm climate)	-----	Weak	Random curls Downward U	small and usually white to pink	8 to 12 cloves	Dark purple, sweet in taste, Difficult to peel	-----	6-8	Ajo Rojo, Burgundy, Creole Red
Silver skin (warm climate)	-----	-----	-----	-----	8-40	Difficult to peel	-----	12	Silver White, Nookota Rose, Mild French, SandH Silver, Idaho Silver

Fig 2. Varieties of Garlic

Source: Sethi Neeraj et al. 2014, *Int. Res. J. Pharm*

Garlic is a perennial plant native to Central Asia whose flavorful bulbs are harvested and used in numerous national dishes. The bulbs have such a strong onion-like scent and then a harsh flavor, therefore they are rarely consumed fresh. Garlic plants reach a height of 60cm (Britannica, 2021). Fresh or dried garlic is among the extremely vital & extensively consumed ingredients for meals. Dried garlic, on the other hand, is mostly used and comes in white, pink, or purple varieties (Britannica, 2021). Garlic is commonly used for flavoring, but also can be consumed raw. Garlic is pungent in its raw state but it gets pleasant when sautéed or baked. Some of the foods which garlic can be used to flavor include salads, jarred sauces, gravies, sauces, veggies, meats, and soups. Garlic butter or garlic toast are common uses for it. If needed, garlic powder is used instead (Recipetips, 2022).

Gastronomy studies food and culture, concentrating on fine dining. Food science, Cooking methodologies, nutritional information, and flavor functions are all included in the phrase "gastronomy". Gastronomy is a skill which entails tasting, learning, investigating, witnessing, publishing, and comprehending meal planning and sensory features of human nutrition. It does indeed, include studying nutrition across societies (NutriGastro, 2020).

Gastronomy is indeed a very fantastic avenue for integrating a passion of food with an inclination for history. Virtually all ingredients is culturally significant.

Gastronomy has now become a multidisciplinary artistic expression consisting of cooking, dining, drawing, dance, theatrical art forms, construction, sculpting, as well as entertainment (NutriGastro, 2020). As a result, gastronomy is more than just a religion of consuming since it entails the intelligence to comprehend and respect a wide range of food processing & methods of preparation.

China continues to be the most populated country in the world. It really has grown drastically to be the world's second biggest economy. It is also the world's 3rd largest country by area. The country is not just large, but also diverse culturally and geographically (Finlandchinago, 2020). To comprehend China, one must consider its richness, as well as its different geographic divisions, historical trends, commercial activity, & assets. In China, politics plays a vital part in fostering a shared identity and uniting the country as well as its regions. The economy of China has expanded rapidly over the last 40 years. The economy is shifting beyond small production towards larger industrial production, as well as from investing to consuming, since its rapid expansion centered on asset industry and exportation reaches its bounds.

The aim of this report is to critically assess garlic in China, seeking to provide an understanding of how much food affects various sectors of a country.

Gastronomy of garlic in China

Any true Chinese meal demonstrates the skill of balance — cool and warm, sweetness and sourness, delicate and spicy. Although the rich, full tastes of Chinese cooking let a meal appear luxurious, it's actually an economical dish that relies on locally sourced, in-season foodstuffs and readily available components (Fontiercoop, 2022).

Chinese regional delicacies include robust vegetables, cabbages, and cereals in Beijing; sweets & seafood just on eastern coast in Shanghai; exotic fruits and veggies in Guangzhou and hot spicy pork, chicken, and vegetarian food in western Sichuan. All of these are expertly prepared with the perfect blend of spices.

Garlic is an essential element in Asian cooking. It is used in Chinese cuisine for its pungent flavor. Garlic is mentioned in a number of classic literature, notably Shi-ching (the Book of Songs), a Chinese classic composed by Confucius and containing the writings of poets as from 12th - 17th centuries BC (Rhonda Parkinson, 2021).



Fig 3. Example of a Chinese Garlic Cuisine: Chinese Sweet Pickled Garlic

Source: www.soupeduprecipes.com

China's trade volume of garlic in 2020 was 2.232 million tons, reaching a record peak in the decade as per Produce Report. In comparison to 2019, this indicates a yearly increase of 500,000 tons, or 28.4 percent. China produces the highest quantity of garlic in the world, accounting for 80% of worldwide output. The garlic season runs from May - December. Garlic is utilized for its health advantages combined with being a spice (Rhonda Parkinson, 2021).

Szechuan and northern-style cooking of China use garlic for its strong flavor. Szechuan cuisine is known for its fiery spicing. Garlic is not so widely recognized in the north of China where brutal winters result in a limited planting season. Northerners depend it for flavoring their cuisine. Garlic is utilized in a variety of Chinese recipes, and it is frequently utilized flavor the oil during stir-fries preparation in China.

The bulb of the garlic is found underground, and the greenish tops are divided into 2 sections. One flower stem and plenty foliage. These 2 parts high treasured in China. The leaves are offered as suanmiao. Suantai are the flower stalks. Whenever garlic is combined with some other powerful

ingredient, such as scallions, ginger, or curry, this results in a delicious meal (Chinese-forums, 2019).

Social Context

Food's significance in conceptualizing human civilization stems from its unlimited variability—variety which is not required for preservation. Humans anywhere could eat same thing in order to survive, with just calories, fats, carbs, proteins, and vitamins being assessed. However, people from various origins eat in quite diverse ways (Chang, 2008). The fundamental ingredients used to create food; the methods used to keep, chopped up, and prepare it; the quantity & availability of choices offered at every mealtime; the flavors preferred and despised; food serving practices; kitchenware; and perceptions about the food's characteristics are all different. There are a lot of these "food factors."

In this case, eating habits could be a substantial, if not deciding, factor. Individuals from the same cultural background or setting have similar eating habits, which means they have similar food characteristics (Jacques Gernet, 1962). Distinct civilizations have various combinations of food components. We may claim that different civilizations have various dietary preferences.

The food habits of people from the same region are not always exclusive. In most cases, they really aren't. There exists multiple expressions of dietary elements within a narrower range, for various social contexts, in same basic eating style (Lau, 1970). Diverse socioeconomic levels and jobs eat in distinct manners. People eat uniquely on special occasions, in sadness, and daily. There are various dietary codes for diverse religious groups. The way men and women eat varies and it also varies at specific times of life. People have different preferences (Chang, 2008).

The overarching dietary philosophy in China would be that the type and volume of food consumed are closely connected to someone's health. This is most likely a theory with substantial, hitherto unknown, basis in science (Chang, 2008). Diet has an impact on health generally, but choosing the correct food in a specific moment should also take into account one's current health situation. As a result, food also is medication. Dietary management as a sickness preventative or curative is unquestionably both Western and Chinese. The arthritic diet and also the contemporary organic food fad are two common Western instances. However, the case of the Chinese stands out because of its fundamental ideas. Complications stem whenever the yin and yang elements in the body are

out of harmony. To mitigate the imbalance, proper quantity of a food or another can be given (Lau, 1970). If the body is healthy, consuming too much of a particular type of food is sure going to cause an overabundance of such a force inside the body, resulting in sickness. All of these factors form very key concept and explanation of the reason why garlic is and will continue to be one of China's topmost spices- as established earlier, considering its numerous health benefits.

Political Context

China's food strategy can be described as a philosophy of self-sufficiency and self-reliance. Since food security is indeed the cornerstone of national safety, the Chinese government follows an independent food policy (Rosegrant, 2003). In many Asian, African, and South American countries, excessive food costs and extreme lack of food have sparked political & social upheaval.

For the purpose of making sure that the economic growth, and political and social stability in the country is achieved, the Chinese government established a grain tactic in 2008, aiming at "persisting in depending on the basic national assurance of availability of food; increasing support from the government; perfecting treble land cautiously; improving thorough grain production capability relying on the progress of science and technology; improving grain regulatory oversight."

The creation of the Household "Responsibility System" has sparked Chinese farmers' ardor for productivity while also significantly increasing agricultural production rates and yield (Yifu, 1997). Ever since, China has continued to produce the majority of its everyday food requirements, and it has reached food self-sufficiency. Nevertheless, as a result of lacking procurement method and the economic restructuring of China in the 1980s, the production of grains in China stalled (Huang et al, 2019). As China's economy has grown, so has the size of its metropolis, followed by urban growth (Deng et al, 2008). The production of food is having difficulty under these conditions (Huang et al, 2019). The Chinese government has suggested the "Red Line of Arable Land Policy" to conserve agricultural land. Notwithstanding regulatory limits on agricultural land transformation, the area of agricultural land continues to shrink (Lichtenberg and Ding, 2008). All of these policies and interventions by the Chinese government continues to give the garlic market in China a strong face in the world. The proactive nature of the Chinese government to quickly address agricultural issues at the policy level is an attitude that other garlic market economies can look up to.

Economic Context

China, the world's top garlic exporter, has experienced poor global demand for garlic in recent times. ²The quantity of garlic exported declined by 20.2 percent from January to May in 2021, compared to 2020. As a result of a worldwide lack of cold storage, increasing sea transportation prices, plus new period of lockdown restrictions, garlic export sales have decreased. Because of the lower quantity of garlic exports, stockpiles rose, pushing down both local and export garlic prices in China (Ayushi Khurana., 2021).

In China, the garlic season begins in June through to August. China exports garlic to Indonesia, Vietnam, Malaysia, the Philippines, and Thailand, accounting for almost 70% of global exports. Due to cold spells mostly in the 2020 winter, it was previously predicted that the garlic production would be smaller than what it used to be. Nevertheless, there has been no proof of a lower yield, because the quantity and richness of garlic were comparable to the previous season.

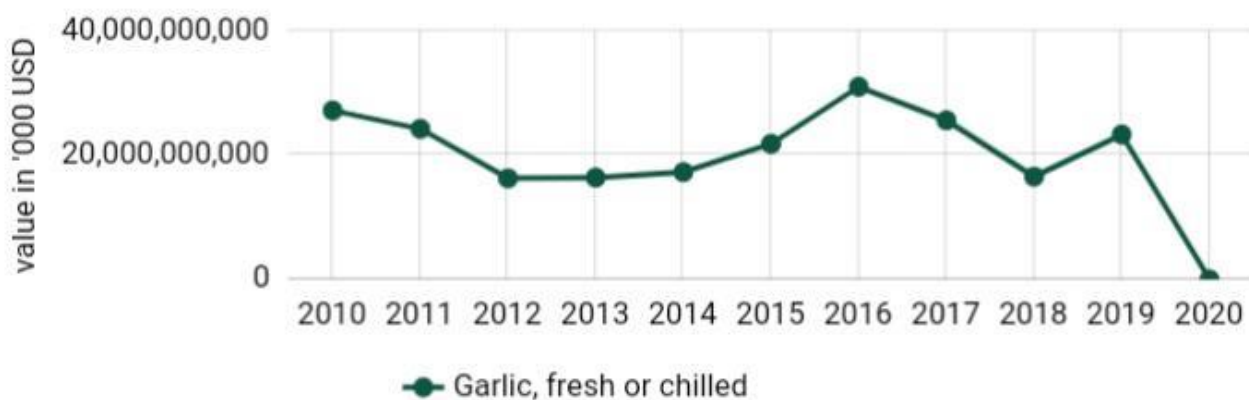


Fig 4. Export Values of China Garlic up till 2020

Source: www.selinawamucii.com

The export of garlic is being threatened by the market's weak demand and prices. There's little request and a huge number of garlic stock. The Chinese garlic export sector has taken a major impact as a result of this. Additionally, the Yuan's strengthening has put a lot of pressure on exporters, lowering prices and quantities yet further.

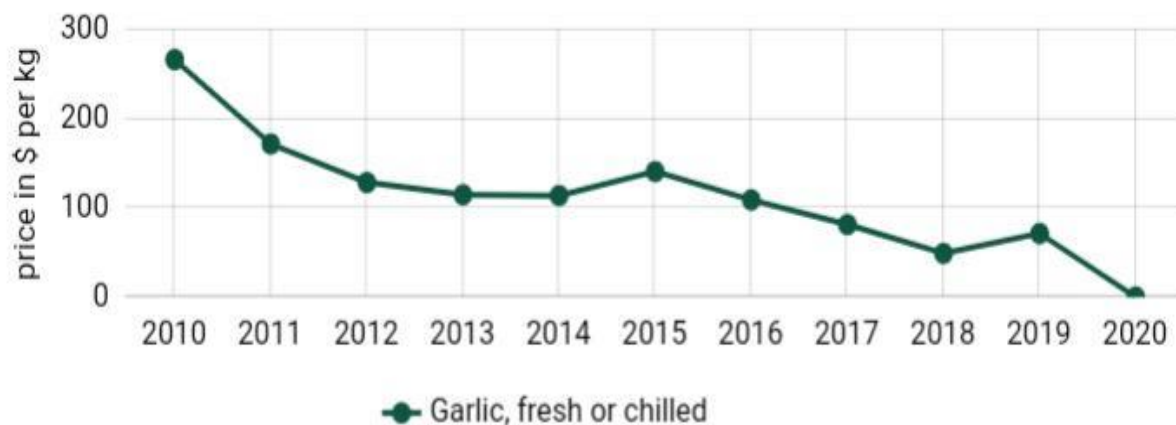


Fig 5. Export Prices of China Garlic

Source: www.selinawamucii.com

Technological Context

Garlic thrives in a broad array of seasonal changes. It cannot, nevertheless, withstand extremes of temperature. In the vegetative growth and bulb development phases, it demands a chilly and wet temperature, but warmer, low humidity towards maturation. Garlic grows best at temperatures between 13 and 24 degrees Celsius. It thrives at heights of 1000-1300 meters above sea level. When garlic is exposed to cold temperatures, bulbils form in the leaf axils. Selection garlic variety is vital for increasing garlic output, and to preserve the survival of the varieties of garlic in China, garlic producers should give importance to techniques that aid in field preparation, planting, weed management, manure application and fertilizing, and harvesting. Given China's massive technological advancements in recent years, it is safe to assume that China will continue to be the leading producer and exporter of garlic, as it is easy to imagine the range of technologies made available by the Chinese government, including gene manipulation, disease management, irrigation, greenhouses, and agricultural extension. This characteristic technological advancement of China is a topmost reason for the high production rate of garlic.

Environmental Context

In China, garlic is usually planted in fall and cultivated in garden beds with drip watering and black, green infrared transmission or blue plastic mulching. Garlic is sometimes "placed" or sown manually in elevated beds having rows that are 6-12 inches between each other and the cloves are spaced 4-6 inches away from each other smaller (Engelend, 1994). Bigger producers utilize transplanters with specialized "containers" to implant cloves at identical distances that the gear allows.



Fig 6. Growing Garlic

Source: www.harvesttotable.com

The majority of garlic varieties should be seeded 1-1.5in in depth, whereas elephant type garlic gets seeded 2-2.5in in depth. A well-drained soil is required for Garlic cultivation. Garlic planted in soils that are badly drained is susceptible to Fusarium bulb rot and some other bulb diseases. The planting of garlic in China is separated into two seasons: spring and fall. Spring planting takes place in March, and fall planting takes place between September & October (PennState Extension, 2015).

Before very cooler temperatures, garlic shoots sometimes sprout just few cm just above soil. Except if temperature drops below freezing, there will be little harm. Using 2–4 inches of mulching when sowing may help decrease this harm while also preserving hydration, preventing freezing heave, and weeding (PennState Extension, 2015).

Considering the environmental conditions required to successfully grow garlics, it is expected that unfavorable condition like climate change will definitely affect the production and also consumption of garlic. Climate change is having a significant impact on China. The country is experiencing the detrimental impacts of climate change in agriculture, and the effects are predicted to worsen. Climate change has begun to have a detrimental impact on the agriculture sector of China. In the prairie, there has been a rise in production volatility in agriculture, significant damage from high temperatures and droughts, and reduced yield and quality. China may be the highest producer of garlic, but the continued increase in unfavorable climatic conditions caused by climate change may change the narrative.

Conclusion

This report has deeply looked at the various factors that can impact the status of garlic in China, especially the gastronomic, economic, social, technological, environmental and political elements. Garlic is highly appreciated in China, mainly for its nutritional and health values as described by different Chinese literatures. The importance attached to garlic in the Chinese cuisine could probably explain why China produces the highest volume of garlic worldwide. A deep analysis in this report helps us to see beyond just the importance of garlic as the reason for the status of the spice in the country. The political, environmental, technological and economic atmosphere of China gives further basis as to why garlic production is large in China compared to any other country. Garlic is highly valued in China, coupled with the technological advancement of China, garlic production could yet see another spike in production rates and volumes despite the setback by the covid lockdown. While environmental factors may serve as hindrances to the production of garlic, the attachment of the Chinese people to garlic on the other hand can serve as a resistance to the downward pull of garlic production. Asia has arguably the largest cuisine in the world and China is a large part of that. Looking at this and the fact that garlic is a major food ingredient in China, it can easily be conceived that garlic production will be resilient against environmental damages. In addition to the social attraction of the Chinese people to garlic and the technological advancement of China, the political proactive nature is another factor that can help sustain the garlic market in the long run. Finally, while all these factors have their importance, the local

farmers still have to be assisted in order to sustain the garlic market. This can be achieved through different empowerment programs and training.

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