

Opinion Article

How Bangladesh can contribute to a competitive global orange industry: An opinion

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ABSTRACT

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The demand for oranges is on the rise globally and in Bangladesh. However, despite having a favourable climate and soil, Bangladesh's share in the global orange industry is still negligible, subsequently making the country a leading importer. Rising national demand, unstable international markets, soaring market prices and changing consumer preferences strongly justify the necessity for increasing domestic production. A 50 thousand-ha orange orchard could earn USD 1.5 to 2.0 billion from the sector by 2035, contributing to the global orange industry significantly. However, the commercial introduction of a new fruit crop is challenging in a land-scarce country like Bangladesh. This opinion article discussed how to increase national production by inserting oranges in the current cropping systems. A national citrus policy facilitating orange cultivation, extension, management, processing, and marketing is recommended. An innovative cropping system management and efficient land use policy can accommodate this perennial fruit crop in the existing farming system. The availability of suitable varieties, efficient extension services, modern management practices, government incentives, strong value-chain and agricultural land-use planning could help achieve the goal of a competitive orange industry in Bangladesh by 2035.



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Introduction

Oranges—popularly known as Mandarins/tangerines and Malta/sweet oranges—are the world's most widely consumed citrus fruit, constituting nearly 13% of total global fruit production (FAO 2020). Nutritional status, taste, consumer preference, storability, and geographic distribution have made this citrus fruit unique and globally important. The global production of oranges (Mandarin-37.8 million tons and Malta-47.57 million tons) was 85.37 million tons in 2022/23 (USDA 2023). Furthermore, fresh orange is the primary raw material for the USD 147 billion global orange juice industry, which is forecasted to reach USD 230 billion by 2035. Orange juice alone constitutes more than 30% (1.6 million tons) of the total global fruit juice industry (USDA 2023). Moreover, the industrial and medicinal value of the

orange peel and its byproducts is significant. Production of essential oils, bio-energies, cosmetics, etc., from orange peels and byproducts is well documented in the literature (Jiménez-Castro *et al.*, 2020). With the rising awareness of consuming vitamin C and antioxidant-rich fruits and the rising global population, the global demand for citrus fruit, mainly orange and Mandarin, is rising steadily. By 2035, the global requirement for oranges is predicted to be more than 200 million tons (Neves *et al.*, 2020).

Going by the global trend, Bangladesh's demand for oranges is rising steadily. Bangladesh's domestic demand might be threefold of the current demand by the next 15 years. Domestic demand in Bangladesh is mainly met by imports. Bangladesh is now a leading importer of oranges. In 2021/22, Bangladesh imported 250 thousand tons of

Mandarins and Malta from China, India, South Africa, Morocco and the EU (EPB 2023). With heavy dependence on imports, Bangladesh might have to spend USD 1.5 to USD 2.0 billion annually to import Mandarin and Malta in 2035, which could put extra pressure on dollar reserves and the economy. Therefore, increasing the domestic production of oranges has been a crucial agricultural issue and policy priority in Bangladesh.

Rising domestic consumption in the main exporting countries like Spain, the USA, South Africa, China, and Egypt has further narrowed the export markets. Furthermore, in recent years, total production has dropped in the major orange hubs – Florida, South Africa, and Spain. The necessity for domestic production was felt seriously when prices of citrus fruits shot up to USD six (6) in 2020. In Bangladesh, the national demand for oranges and Malta is predicted to be 750 thousand tons in 2035. Thus, dependence on imports might be risky and likely to destabilize the domestic citrus market if international supply is reduced somehow. Therefore, investment in research and extension for increasing orange cultivation and production is necessary. However, inserting this perennial fruit crop in the existing cropping system has been challenging due to scarce agricultural lands and fierce inter-crop competition. This opinion article aims to discuss the policy scopes, preparedness, and challenges to increasing the domestic production of oranges.

Vision for the Billion-dollar Orange Industry

Responding to global trends, market prospects and domestic demand, Bangladesh has set a national vision for a one-billion-dollar orange industry by 2035 (MOA 2023). With proper planning, research, and extension, Bangladesh can achieve its goal within this time frame. However, to materialize the vision, Bangladesh needs to spare more than 50 thousand ha of agricultural land, which could be a daunting policy task. If Bangladesh can increase the current yield (10-12 t/ha) up to 20 t/ha, national production from 50 thousand ha would be more than one million tons. A 50,000-ha orange/Malta orchard could earn USD 1.5 to 2.0 billion from the sector by 2035, boosting the competitiveness of the global orange industry.

The status of the citrus industry

Bangladesh's share in the global citrus industry is still insignificant. Lemon (*Citrus limon*), lime (*Citrus aurantifolia*), grapefruit (*Citrus paradisi*), and pomelo (*Citrus maxima*) are common citrus fruits grown mainly in the homestead garden. Bangladesh's sub-tropical climatic conditions and fertile soil are suitable for commercial citrus cultivation. However, large-scale cultivation of citrus fruit is still limited. Currently, national citrus production is 165,327 tons from 41000 ha of land (Figure 1) (BBS 2022, DAE 2024). With technical support from the Department of Agricultural Extension and Bangladesh Agricultural Research Institute, the area under citrus fruit production is rising gradually.

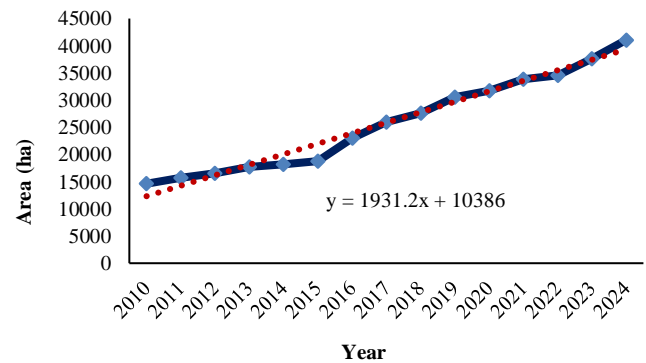


Figure 1: Trend of the area under citrus fruits in Bangladesh.

Commercial orange (Mandarin and Malta) cultivation is relatively new in Bangladesh. Bangladesh Agricultural Research Institute started research with developing varieties in the early 1990s and released BARI Malta- 1 variety in 2004. A few interested and progressive farmers started planting Malta and Mandarins on the homestead after 2005. This variety came into the farmer's fields after 2010 with extension support from the Department of Agricultural Extension. The good performance motivated farmers to start small-scale cultivation in their fields. Interest in orange cultivation multiplied steadily and this exotic fruit species was introduced in the farmer's field successfully within few years. Since 2010, rising interest in the commercial cultivation of Malta and Mandarin among farmers has created a new opportunity for increasing area and production. The production success of these exotic fruits has gained public interest and media coverage.

As a new fruit crop in Bangladesh's environment, oranges face some agronomic challenges, such as sweetness, colour, yield, size, disease, etc. However, these agronomic issues can be resolved with holistic research and extension. Bangladesh Agricultural Research Institute and universities' citrus research team has been trying relentlessly to develop suitable varieties and production technologies. Bangladesh Agricultural University developed BAU Malta-1, BAU Malta-2, and BAU Malta-3. BARI Malta 2 is already in the field. Florida- a leading place for orange production- took more than one hundred years to be the global leader in the citrus industry. However, Bangladesh has achieved remarkable success within twenty years since it started in the early 2000s. During the last 10 years, acreage for orange orchards reached 7000 ha, and Bangladesh harvested 72 thousand tons of Mandarin and Malta in 2021 (DAE 2022). The farm gate price of Malta and Mandarin was USD 0.7 per kg and USD 1.4 per kg, respectively, in 2021 (DAM 2022). Locally produced Malta and Mandarin are cheaper in the local fruit shops. New orange orchards in Bangladesh are mainly located in western parts of the country (Chuadanga, Meherpur, Kushtia), North Bengal (Panchagar, Thakurgaon, Dinajpur, Chapai Nawabganj), the Sylhet region, the Hill Tracts and the central part (Tangail, Mymensingh, Narsingdi, Comilla). However, the whole country is suitable for Malta cultivation.

Scopes in increasing orange cultivation

Sparing extra agricultural land for orange cultivation is a major challenge in Bangladesh. With comprehensive land use planning and farming system management, it is possible

to spare land for oranges in suitable geographical locations such as North Bengal, Hill tracts, and Northeastern regions. However, sparing cultivable lands for a new crop is always a tough policy decision in a land-scarce country like Bangladesh. In Bangladesh, land has become a heavily contested natural resource due to intensive competition among crop agriculture, aquaculture, economic zones, afforestation, livestock production, orchard development, mega power plants (e.g., Rampal power plant), the tourism industry, mangrove forests and other non-agricultural purposes. The country usually spares more than 70% of its cultivable land for rice-based farming systems to ensure rice security for the rising population (Jamal *et al.*, 2022). Again, there is mounting pressure to increase non-rice crops (e.g., pulses, oilseeds, vegetables, spices, and tuber crops) production requiring extra cultivable lands. In recent years, farmers have been moving towards high-value crops (fruits, vegetables, spices), encouraged by the economic prospect and profit potential. Moreover, the rising cultivation of feed crops (maize, grass pea, soybean), and fodder crops (maize, green grasses) have been pushing extra pressure on agricultural land, currently occupying nearly 6.5 lac ha of land (DAE 2022). Research, policy, and extension focus on spice crops (onion, garlic, ginger), cut flowers, fruit orchards (mango, litchi, guava, jujube), oilseeds (mustard, soybean, sesame, sunflowers) and all-season vegetables has increased the land use competition. Cotton, tobacco, jute, and tea are getting policy and business attention, requiring extra land for cultivation. The conversion of crop fields for non-agricultural purposes is another reality, as cultivable land shrinks over time. In this context, inserting new perennial fruit crops like oranges could obviously be challenging. However, despite all these land use and farming system challenges, there is a strong justification and bright scope for allocating 50 thousand ha crop fields for high-value Malta and Orange cultivation.

Now, the concern is how to insert this new fruit crop into the existing cropping system. Farming system research and land use planning can accommodate nearly 50 thousand ha of orange orchards in the existing cropping system. The fruit tree-based agroforestry system is becoming popular in Bangladesh, allowing maximum utilization of space (soil and aerial space) and time. A research and validation trial with winter vegetables (e.g., spinach, broccoli, carrot), pineapple, and spices (ginger, chilli, coriander leaves) in Malta garden found profitable (Das *et al.*, 2020). Declining agricultural land, climatic change, and motivation for cropping intensification justify this intercropping system.

During the National Tree Plantation Campaign (June to August), Malta and orange saplings can be distributed to farmers and institutions free of cost. Low canopy Malta is suitable for dike cropping in shrimp/prawn ponds in coastal Bangladesh. Malta is performing better in rooftop gardening in cities as well (Islam *et al.*, 2019). Homestead gardening in the rural housing project can increase acreage. A stable and fair market price is necessary to motivate farmers in the commercial cultivation of oranges. In the Sylhet and Chittagong regions, there is a higher scope for expanding oranges. Profitability is the most important factor before introducing a new crop in the existing cropping system (Jamal 2022) Orange cultivation is more profitable than other cereal crops and vegetables, so farmers are likely to be encouraged to grow this fruit crop. Citrus Development

Project can launch various extension activities to promote orange cultivation.

In recent years, Bangladesh has achieved remarkable research and extension capacity for Malta cultivation. Bangladesh Agricultural Research Institute has so far released six varieties of Malta and Mandarin. Researchers have been trying to develop high-yielding and disease-resistant varieties. The extension of citrus fruit is a priority extension programme of the Department of Agricultural Extension. Citrus Development Project has been launching different extension activities like demonstrations, motivational tours, input support, training, and market link-up with a view to increasing the area and production of citrus fruits.

The adoption rate of commercial Mandarin and Malta is tremendous compared to other new crop interventions. With good profitability, Mandarin/Malta could be a better cropping option than mango, litchi, and jujube in many places. The harvest season of Malta/Mandarin is longer than that of other seasonal fruits (mango, jackfruits, and litchi). There is no alternate bearing issue in Malta/Mandarin like mango. The average yield of mango and Malta is closer; however, the market price of Mandarin is much higher than mango. Moreover, post-harvest losses of Malta and Mandarin are lower than mango, jackfruits, and other juicy fruits.

CONCLUSION AND POLICY RECOMMENDATIONS

Considering climatic and soil conditions, market demand and good market price, Bangladesh should increase the cultivation area of oranges. While Bangladeshi farmers are successfully growing many exotic fruits like strawberries, dragon fruit, avocado, rambutan, etc., the cultivation of oranges would not be a big challenge. However, the availability of a promising variety is still a problem for the commercial cultivation of Mandarins/Malta. For a perennial crop, variety selection is critical, as farmers cannot change if it performs badly. Deception by poor-quality seedlings might frustrate and demotivate farmers. Therefore, researchers and extension people should take the utmost care to supply high-quality saplings. Incentives for establishing the orchard in the first year could promote the rapid expansion of oranges in Bangladesh. Necessary steps to improve farmers' capacity in efficient production and management can increase profitability. A strong value chain is recommended to ensure a fair price. National Land Use Planning should seriously consider Malta and Orange cultivation issues. Bangladesh needs a National Citrus Policy to strengthen the competitiveness of the citrus industry. This opinion article could stimulate policy action to achieve the ambitious goal of USD 1.5-2.0 billion for the orange industry by 2035, contributing to a stable and rising global orange industry.

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Credit authorship contribution statement

Md Roushon Jamal: Conceptualization, Original draft preparation, Writing, and Editing. Mohammad Abdul Kaium

Majumdar, Faruque Ahmed and Mst. Jerin Tasnim: Conceptualization, Writing. Md Abdur Rahim and Mst Irin Parvin: Editing

Data Availability

No data were used for the research described in the article.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The opinion article has no conflict of interest.

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