

# Status of production and trading practices of citrus in India

## Abstract

Citrus particularly Lemon is a fruit that is widely demanded among the consumers of different strata. With respect to Lemon production at the global level, Mexico and India are the toppers. Argentina is third in lemon production. In an Indian situation, Maharashtra and Andhra Pradesh are the forerunners in enhancing the area under Lemon. Madhya Pradesh and Rajasthan are making concerted efforts to enhance the area under Citrus considering its importance. Among the Citrus fruits, Mandarin and the Lemon are the predominant in terms of production. In Tamil Nadu, Thenkasi District was found to be the topper in terms of area and production of Citrus. While analyzing the costs and returns in establishing the Citrus orchards in the part of Central Tamil Nadu, the cost of production is found to be in the single digit and the sale price in the market is many times higher and hence the farmers are having higher area allocation in the farm holdings. The harvest practices were found to be predominantly twice a week and trading practices are direct selling and selling through the commission agent and the fruits are also being exported to different nations from India. Only the two countries Bangladesh and Nepal are able to absorb our lemon fruits to a greater extent. In addition, the limitations that manufacturers encounter are examined, along with suitable methods to mitigate them.

**Keywords:** citrus, lemon, area production and productivity, top ten producers of lemon

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## Introduction

Citrus is native to South East Asia, covers a large area, which extends from Himalayan foothills of North East India to North Central China, the Philippines in East and Burma, Thailand, Indonesia and New Caledonia in South East. In India, in terms of area under cultivation, Citrus is the third largest fruit crop after Banana and Mango. The average yield of Citrus fruits in India is alarmingly low (8.8 Tonnes / ha) compared to other developed countries like Indonesia, Turkey, Brazil and USA (22-35 Tonnes / ha). India ranks third in Citrus production followed by China and Brazil. In India, it is cultivated in an area of about 10.95 million hectares with a production of about 148 million tonnes.<sup>1</sup> Madhya Pradesh stands first in terms of Orange production in India. This is due to the suitable agro-climatic condition that prevails for large-scale orange cultivation. Among Mandarins, Nagpur Mandarin (Central India), Kinnow Mandarin (North-West India), Coorg Mandarin (South India) and Khasi Mandarin (North-East India) are the commercial cultivars of India. Whereas, Mosambi (Maharashtra), Sathugudi (Andhra Pradesh) and Malta and Jaffa (Punjab) are the sweet orange cultivars are traditionally grown. About 1000 to 1500 fruits can be harvested per tree per annum and 15 to 20 tonnes per ha per year could be realized as yield. The common practice of harvesting is to pull the fruits from the branch which may rupture the skin near the stem end leading to fungal infection and rotting. Therefore, fruits should neither be plucked nor torn off but should be cut off with clippers.

Tiruchirappalli is a Central District of Tamil Nadu which is a known place for cultivation of Citrus particularly the lemon in the non-Cauvery belt. Most of the farmers in this tract have the habit of raising Cotton and Lemon as their principal crop in their farm lands as it attracts higher returns per unit of land as other crops require more water for their establishment. In this respect, the study was initiated with the objective of assessing the status of production of fruits particularly Citrus in different states of India, assessing the cropping pattern in vogue with the farmers in the dry belt and its associated investment costs and benefit realization out of lemon cultivation.

## Design of the Study

Agriculture is the principal activity in Tiruchirappalli District which is blessed with Cauvery water and hence cultivation of paddy is predominant in the delta zone. But the dry land crops like cotton and lemon are being cultivated widely in the zone of dry tracts and hence efforts were taken to assess the reasons for such preference while there was so many dry land crops to be practiced in the farmlands. For that purpose, the study area was selected as Mannachanallur Taluk of Tiruchirappalli District as it encompasses a large number of farmers who are interestingly cultivating Citrus seedlings as their main crop and hence it was selected purposively in the First Stage. In the second stage, the list of number of blocks available in Mannachanallur Taluk and enriched with Citrus cultivation was enlisted from the records of Department of Agriculture and Farmers Welfare, Government of Tamil Nadu. In the third stage, the number of villages in which the higher area under Citrus in each block is chosen and 6 households were selected accordingly following the norms of the top five villages following three-stage random sampling technique. In this respect, the study has considered and selected 30 sample Citrus farms in the study area as its ultimate samples.

## Data collection

For this study, both primary data and secondary data were used. Primary data was generated through a well-structured interview schedule designed for the farm-level survey and the same was pretested in the field appropriately and modified accordingly. The method of data collection was done by personal interview. Data on general characteristics of farmers like age, education, farming experience, size of the land holdings, crops grown in the area, awareness and adoption of inputs, knowledge application of inputs and farmers preferences on raising Cashew as their main crop, economics of cultivating the crops and the returns realized from the crop. Secondary data like the top ten producers of Citrus in India and the World, the area under fruit crops and Citrus in particular from different website pages, the area, production and productivity of Citrus were gathered from the records

of Department of Agriculture and Farmer’s Welfare, Trichy and are suitably analyzed using percentage analysis.

### Study period

The reference year for the study was the agricultural year 2023 and the collection of data from the sample households were taken up during the months of April to June 2024. Economic appraisal tools like Benefit-Cost Ratio and Net Present Value are analyzed and assessed for its Economic worthiness of cultivation.

### Tools of analysis

Conventional percentage analysis, Benefit Cost Ratio and Net Present Value analysis were carried out to assess the financial worthiness of the cultivation of Citrus particularly the lemon in the farm holdings.

## Results and Discussion

Citrus is one of the holy fruits not only used for holy purposes but also for its delicious nutrients and flavor in making various soft drinks during the summer and hot months to the consumers. In this respect, it is not only gaining importance in India but also in the developed and developing nations. During the hot months, the demand for the fruit is alarmingly increasing. In this respect, the status of Citrus cultivation in the study area is discussed under the following sub heads. They are,

- The top ten lemon producers in the World
- The top ten producers of fruits and citrus in India
- Type of citrus fruits produced in India
- Area, production and productivity of citrus in Tamil Nadu
- Cropping pattern in vogue with the citrus farms
- Harvest practices prevalent among the farms
- Economic appraisal of citrus cultivation in the farms
- Trading practices prevalent in the farms
- Export of citrus from India

### The top ten lemon producing nations across the globe

Lemon was found to be a principal fruit in the routine lifestyle of consumer households for both auspicious and culinary events. Because of its need in various uses, the lemon is being cultivated not only in India but also in different countries and hence effort has been taken to assess the top ten global producers of lemon and the data are analyzed at different points in time and the results are presented in Table 1.

Table 1 revealed the details of production of lemon during different points in time viz. 1999-2000 and 2001-2002. Considering these two year data, the percentage change in the production of Lemon during 2002 over 2000 was worked out for the top ten nations across the Globe. Mexico, India, Argentina and Iran were found to be the toppers in Production of Lemon in the world. The percentage change in the Lemon production during the year 2022 over the year 2000 accounted for only 0.44 percent in respect of Mexico, though it stands first as a Global producer of Lemon. But, Argentina produced a higher quantity of Lemon during the year 2022 which accounted for 3.18 per cent increase over the year 2000. However, there is no change in the absolute quantity in the production data with respect to India. Because, India is augmenting the production level between these periods after taking concerted efforts.

**Table 1** The world’s top ten lemon producers

Sl. No	Country	Production in thousand tonnes (1999-00)	Production in thousand tonnes (2000-01)	Production in thousand tonnes (2001-02)	Percentage change during 2002 over 2000
01	Mexico	1593	1573	1600	00.44
02	India	1400	1400	1400	00.00
03	Argentina	1163	1217	1200	03.18
04	Iran	1033	1039	1039	00.58
05	Spain	746	846	1018	36.46
06	USA	773	895	742	(-) 04.01
07	Italy	582	537	572	(-) 01.72
08	Turkey	577	377	590	02.25
09	Brazil	580	578	580	00.00
10	Egypt	278	251	269	(-) 03.24

(Source: United State Department of Agriculture)

Spain is in the rank of fifth and has enhanced its production of Lemon during the year 2022 to the extent of 36.46 per cent increase over the year 2000. None of the countries has faced such sudden change in the production level. It might be due to area enhancement, technology adoption and intensive care in maintaining Lemon orchards in that country. The Secrecy of producing such an increase may be learnt and the same may be transformed in other nations to achieve higher production levels.

It is also observed that the United States of America, Italy and Egypt have faced a declining trend in the production level of Lemon during the year 2022 over the year 2000. The percentage decrease in the production of Lemon is ranging between 2 to 4 per cent. The countries who are facing such a sudden decrease in production can explore the success story available with Spain and the same may be implemented for higher-level achievement under Lemon.

### The top ten producers of fruits and citrus in the national scene

Since Citrus is one of the kinds under the head “Fruits”, let us first assess the area under the fruit crops and how much share the citrus is in possession is important. Absence of sufficient data from the publications, the published data from the articles relied upon to compare how the area under fruit crops has faced a shift between 2011 and 2021 and how much the share of Citrus in that. These details are analyzed and the results are presented in Table 2.

Table 2 outlined the details of area under fruits and is compared with two different points of time leaving a decade of time. Between 2022 and 2011, Percentage increase in the area under Fruits is observed heavily in Madhya Pradesh followed by Rajasthan which are respectively accounted for 73.83 per cent and 60.24 per cent. Punjab is able to enhance the area under fruits to the level of 36.48 per cent in a decade of time followed by Assam is able to increase the area under fruits to the tune of 28.27 per cent in a decade of time. Maharashtra and Andhra Pradesh are able to decrease their area under fruits in a decade of time which accounted for 85 per cent and 17 per cent over the year 2011. Uttarakhand is also facing such a decrease in the percentage area though it has potentials to enhance the area. The Department of Horticulture and Plantation Crops in the respective states should examine the causative factors in reduction of area may be examined and the strategies may be taken up to boost the area and production of fruit crops.

**Table 2** The top ten fruits and citrus producing states of India

Sl. No	State	Area under fruit crops during 2021-22 In 1000 Ha	Area under fruit crops during 2010-11 in 1000 Ha	Area under citrus during 2010-11 in 1000 Ha	Percentage change during 2022 over 2000
01	Andhra Pradesh	788.22	921.10	128.20	(-) 16.85
02	Maharashtra	831.18	1540.60	278.00	(-) 85.35
03	Punjab	106.43	067.60	44.70	36.48
04	Madhya Pradesh	432.24	113.10	45.00	73.83
05	Gujarat	432.52	352.90	39.20	18.40
06	Karnataka	416.22	351.00	15.70	15.66
07	Rajasthan	080.75	032.10	20.60	60.24
08	Assam	163.54	117.30	27.40	28.27
09	Orissa	366.66	302.10	27.50	17.61
10	Uttarakhand	181.07	193.80	27.40	(-) 07.03
<b>Total for India</b>		<b>7049.40</b>	<b>6329.20</b>	<b>846.50 (13.37)</b>	<b>10.21</b>

(Source: Ministry of agriculture and farmers welfare, Government of India) (Figures in parentheses indicate percentage area under citrus to total area under fruits)

Overall area under Fruits in India is found to be on the increase to the level of 10 per cent. But the share of area under Citrus during the year 2011 accounted for only to the level of 13.37 per cent to the total area under fruits in India. Hence, concerted efforts are to be taken by the Government for augmenting the production and productivity level by prescribing and adopting the proven technologies in vogue with Citrus and Fruits. We have seen the details of area under fruits in a decadal time and assessed the changes. It is important to assess the type of Citrus fruits which are occupying the area and are capable of producing to meet the domestic and export market requirements and hence these data are analyzed and the results are presented in Table 3.

**Table 3** Details of type of citrus fruits produced in India

Sl. No	Name of the fruit crop	Area during 2018-19 in 1000 Ha	Production in 2018-19 1000 tonnes	Area during 2020-21 1000 Ha	Production in 2020-21 1000 tonnes
01	Lime / Lemon	305	3482 (11.41)	333	3750 (11.26)
02	Mandarin	469	6243 (13.31)	462	6026 (13.04)
03	Sweet Orange	187	3266 (17.46)	203	3825 (18.84)
04	Others	067	0412 (06.14)	088	661 (07.51)
<b>Total</b>		<b>1028</b>	<b>13403 (13.03)</b>	<b>1086</b>	<b>14262 (13.13)</b>

(Source: National horticulture board, 2021)

Table 3 revealed the details of type of Citrus fruits occupying the area and their production in a different point of time in respect of India. The fruits categorized under the head Citrus are Lemon,

Mandarin, Sweet Orange and other Citrus fruits. These fruits have occupied an area of 1028000 ha during the year 2018-19 and are capable of delivering their output to the tune of 134 lakh tonnes with an average productivity of 13 tonnes per ha. Whereas, the area under these fruits and its production details are marginally increased during the year 2020-21 which are respectively accounted for 5.64 per cent and 6.40 per cent over the year 2018-19. But the productivity of Citrus fruits is found to be augmented with 13 tonnes per ha. At national level, this level of productivity is appreciable when compared to the regional figures in Tamil Nadu.

**Area, production and productivity of citrus in Tamil Nadu**

The status of assessing the area under Citrus, its production and productivity both at a national level and regional level will be very helpful in comparing the yield realized at regional level with the national level data. It will show our current position as well as the physical and technological strategies that will be used to reach the goal. In this regard, Table 4 presents the findings of an analysis of the area and citrus production data in Tamil Nadu.

**Table 4** Area, production and productivity of citrus in different districts of Tamil Nadu during 2022 -2023

Sl. No	Districts	Area (in ha)	Production in tonnes	Productivity in tonnes per Ha
01	Tenkasi	3079 (28.60)	23120	07.50
02	Dindigul	2354 (21.87)	12255	05.20
03	Tiruchirappalli	1024 (09.52)	6289	01.59
04	Thoothukudi	758 (07.04)	1255	01.65
05	Virudhunagar	717 (06.67)	1456	02.03
06	Theni	674 (06.27)	697	01.03
07	Pudhukottai	453 (04.20)	4001	08.83
08	Madurai	362 (03.36)	1697	04.68
09	Perambalur	332 (03.08)	1069	03.21
10	Tirunelveli	281 (02.62)	1412	05.02
11	Salem	170 (01.58)	902	05.30
12	Thirupathur	154 (01.43)	817	05.30
13	Sivagangai	143 (01.33)	759	05.30
14	Namakkal	132 (01.23)	700	05.30
15	Thiruvannamalai	129 (01.20)	685	05.31
<b>Total for Tamil Nadu</b>		<b>10762 (100.00)</b>	<b>57114</b>	<b>05.30</b>
<b>India Total 2020-21</b>		<b>1086000</b>	<b>14262000</b>	<b>13.13</b>

(Source: Department of horticulture and plantation crops, Government of Tamil Nadu, 2022-2023) (Figures in parentheses indicate percentage to total area)

Table 4 outlines the details of the area under Citrus in different districts and its production details. It is to learn that Tamil Nadu is not even able to occupy one per cent of Area under Citrus at National level. In respect of production of Citrus, it is not even touched the level of 0.50 per cent of National scene. This is mainly due to the poor monitoring and implementation of technological advances in Tamil Nadu. In respect of productivity realization in Citrus, Tamil Nadu is able to achieve the average productivity of 5.30 tonnes per ha. But the national productivity is arrived at the level of 13.13 tonnes per ha. Tamil Nadu is able to achieve the productivity of Citrus to the level of 40 per cent of national achievement. The road to achievement of national figure 1 by Tamil Nadu is a cumbersome process. If they take

concerted and planned efforts in the coming years, the productivity level could definitely be achieved.

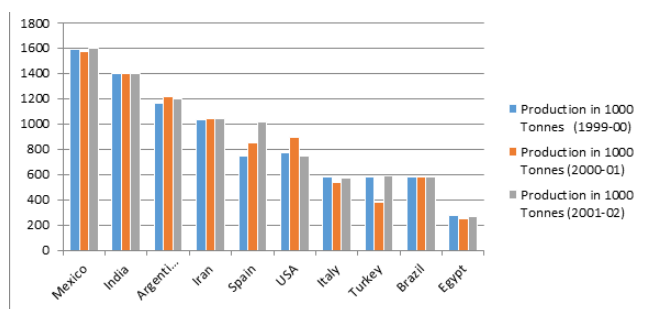


Figure 1 Graphical representation of world's top ten lemon producers.

Table 4 revealed that Tenkasi District is found to have the highest area under Citrus in Tamil Nadu followed by Dindigul District. Since, Tiruchirappalli is the study area which is ranked third in respect of area under Citrus, Its productivity is hovering around 1.59 tonnes per ha which is very low when compared to other districts. It might be due to the black Clay soil with gravel mix not permitting

the plant to grow further and hence retention in growth and yield is visible in that locale. Whereas, the productivity is favourable with Pudhukottai District as it attracts red loamy soil that promotes root system and growth of plants without any constraint and is able to achieve productivity to the level of 8.83 tonnes per ha. The lowest productivity is visible in respect of Theni District which has yielded only one tones of fruits per ha. Though the soil is found to be rich, the reason for lowering of productivity of Citrus needs to be examined by conducting a socio Economic Research by the Horticultural College and Research Institute, Periyakulam, Theni District and the productivity enhancement possibilities may be charted out to reach the level of National productivity in Citrus.

### Cropping pattern in vogue with the citrus farms

It is learnt that around 47 per cent of the sample heads are depending on agriculture alone as their occupation for their earning. Here it is important to know what kind of crops are being cultivated in the available holdings to realize the sufficient financial needs of the farm households. In this respect, the details of cropping pattern prevailing with the sample heads are analyzed and the results are presented in Table 5.

Table 5 Cropping pattern practiced by the citrus farm heads

Sl. No	Size of Farm	Cropping Pattern (Ha)					Total Area in Ha
		Paddy	Citrus	Cotton	Groundnut	Gingelly	
01	Marginal	00.30 (37.50)	00.50 (62.50)	00	00	00	00.80 (100.00)
02	Small	00.20 (11.76)	01.20 (70.58)	00.20 (11.77)	00.10 (05.89)	00	01.70 (100.00)
03	Semi-Medium	00.50 (16.67)	02.00 (66.66)	00	00.60 (16.66)	00.50 (16.67)	03.60 (100.00)
04	Medium	01.50 (25.00)	03.00 (50.00)	00	00.75 (12.50)	00.75 (12.50)	06.00 (100.00)
05	Large	04.00 (33.33)	05.00 (41.66)	02.00 (16.66)	00.50 (4.16)	00.50 (4.16)	12.00 (100.00)
<b>Mean Size of Holding</b>		<b>01.30 (26.10)</b>	<b>02.34 (46.98)</b>	<b>00.60 (12.05)</b>	<b>00.39 (07.84)</b>	<b>00.35 (07.03)</b>	<b>04.98 (100.00)</b>

Table 5 has classified the farm into Five Categories based on the size of the holdings prescribed by the Government Organization like Department of Agriculture and Farmers' Welfare viz. Marginal farms with less than one ha area; Small Farms; Semi-Medium; Medium and the Large farms. Here, the average size of holding is arrived at 4.98 ha. In that, the paddy crop was established in an area of 26 per cent, Citrus was established in an area of 47 percent of the farmland, Cotton was raised in the farmland to the tune of 12 percent of the area, Groundnut was raised in the space of 7.84 percent and finally, the Gingelly was raised in the space of 7 percent of the farm area. All these are rotated based on the season and its suitability. The marginal farms are restricted their crops with Citrus and Paddy which are respectively sharing their space to the tune of 63 percent and 37 percent and none other crops are visible in their farm lands. The small farm category had the options of raising Paddy, Citrus, Cotton and Groundnut in their farms by allocating 12 percent of the land for Paddy; 70 percent for Citrus; 12 percent of the space for Cotton and 6 percent of the space for Groundnut. All other categories of farms like Semi- Medium, Medium and large farms have all options of raising the preferred crops besides their choice of establishing Citrus in their farmlands.

### Harvest practices prevalent with citrus farms

Under this head, the harvest practices are exclusively analyzed as the farms are practicing different approaches. Harvesting of Citrus, particularly the lemon in the sample farms and its periodicity of harvest are not documented anywhere and hence the farmers specifically discussed the frequency and method of harvest that is needed for lemon. In this respect, the periodicity of harvest of Citrus is analyzed and the results are presented in Table 6.

Table 6 Frequency of harvest made in citrus

Sl. No	Frequency of harvest	No. of farms practicing	Percentage to total
01	Thrice in a Week	12	40.00
02	Twice in a Week	15	50.00
03	Once in a Week	03	10.00
<b>Total</b>		<b>30</b>	<b>100.00</b>

Table 6 outlines the details of the harvest practices of Lemon. In that the farmers are resorting to the practice of harvesting the lemon weekly twice which is reported by 50 percent of the households followed by weekly thrice extraction practices prevalent among 40 per cent of the sample farms and the harvest is made once in a week is prevalent with only 10 per cent of the farms. It is mainly due to the absence of timely labour availability for that purpose. This is common in respect of both family labour and the hired labour force.

### Economic appraisal of citrus orchards

Under the head of the economic appraisal, tools were used to appraise the worthiness of investment in Citrus Orchards are Cost of Production of Lemon, Benefit Cost Ratio, Net Present Value and Net income realizable under undiscounted terms. These details are furnished in Table 7.

**Table 7** Economic appraisal of citrus orchards

Sl. No.	Particulars	Amount in Rupees
01	Total Annual Cost in Rs	28426.00
02	Gross Income per Annum in Rs	234181.81
03	Net Income per Annum in Rs	208340.00
04	Cost of Production Per Kg	04.20
05	Benefit Cost Ratio (BCR)	05.56
06	Net Present Value (NPV) in Rs	771524

(Source: Field survey; figures in parenthesis indicates percentage to total)

Table 7 revealed that the net income realizable per annum is arrived at Rs. 2.08 lakhs. The gross income realizable per annum is arrived at Rs. 2.34 lakhs and the cost involved is arrived at Rs.0.28 lakhs per annum. The discounted values gave the Benefit Cost Ratio of Rs. 5.56 which explains that for a rupee of investment, Rs. 4.56 could be generated as net income from the Citrus orchard explaining that better revenue generation is possible from the Citrus orchard under dry land conditions. The Net Present Value arrived at Rs. 7.71 lakhs revealing that the enterprise is capable of fetching the highest return from one ha area. When one could examine the cost of production per kg of Citrus, it arrived at Rs. 4.20 per kg. But the sale price is prevailing at the level of above Rs. 50 and hence the enterprise seems to be profitable.

Technology applications and careful maintenance with application of inputs at periodic intervals could generate the highest income and hence the farmers in the dry tract can opt for investing their money into the Citrus orchards. It will definitely raise their standard of living in a shorter period of time. That will give the satisfaction to the farming community that they are not only helping themselves but also to the consumers in the external environment.

### Trading practices prevalent among the citrus farms

The harvesting of lemons will be a regular practice in the zone. In case of non-availability of labour force for harvesting lemon forced a few of the farms to resort to the harvest practices once a week. The practice of collecting the fruits once a week promotes uniform yellow color development in the plant. On harvesting, the market preference for the yellow color fruits becomes possible. However, the plucked fruits are to be sold and hence the trading practices are analyzed and the results are presented in Table 8.

**Table 8** Trading practices prevalent among the sample farms

Sl. No	Method of trading	Number of farms	Percentage to total
01	Direct Selling	05	16.67
02	Through Commission Agent	19	63.33
03	Directly to the Wholesale Store in the City	06	20.00
Total		30	100.00

The harvested lemons are dumped in bulk and the infected and the partially dried fruits are removed from the lot and are packed in Gunny bags of 1000 numbers each and are being dispatched to the market through the Commission Agent which is accounted for 63 percent to the total trading practices. Around 20 percent of the trading took place through the wholesalers and the direct selling practices are also prevalent among the 17 percent of the sample farms who had established liaison with the traders in Chennai City and Kerala.

### Export of citrus from India

Besides trading in the regional market, the export of Citrus fruits is also taking place. Though the export of Citrus is prevalent, the documentation of current year data is almost absent from the authorized sources and hence the available data is presented for the year 2021 to highlight the importance of citrus fruits and their demand in nations. These details are analyzed and the results are presented in Table 9.

**Table 9** Export of citrus fruits (fresh / dried) from India during 2021

Sl. No	Name of the country	Quantity exported in tonnes	Revenue (Rs. in lakhs)	Percentage to total
01	Bangladesh	141262.63	40764.38	87.02
02	Nepal	20214.26	4103.90	12.45
03	United Arab Emirate	442.88	201.13	00.28
04	Oman	108.92	50.39	00.07
05	Qatar	85.05	44.27	00.05
06	Saudi Arabia	93.45	37.76	00.06
07	Kuwait	78.11	30.31	00.04
08	Bahrain	34.19	13.10	00.02
09	Bhutan	11.35	11.16	00.01
10	Singapore	00.32	00.22	00.00
		162331.16	45256.62	100.00

(Source: Agricultural and processed food export development authority (APEDA), Government of India)

Table 9 revealed the details of quantity of export of Citrus fruits to the different nations and its value realization in terms of INR in lakhs. Among the ten participating nations, Bangladesh alone is able to absorb 87 per cent of Indian Citrus to their destination followed by Nepal the neighboring destination has absorbed 12.45 per cent of the Citrus from India. These two nations alone have imported around 99.45 per cent of the Citrus fruits. Other destinations are able to consume only in fractions of less than one percent. The exporters from India should concentrate the higher volume of exports specifically to the Islamic nations so that the domestic production could further be enhanced.

### Constraints faced by the producers of Citrus

In the cultivation process of Citrus, the farmers are facing certain constraints. These are assessed based on the attributes floated by the researchers to the producers and their ranking is taken care of and the results are presented in Table 10.

**Table 10** Constraints faced by the producers of citrus in the sample farms

Sl. No	Attributes	Number of farms reporting the constraints	
		Varieties that are suitable to our soils are not available	Poor transfer of technology in citrus
01	Strongly Agree	10 (33.33)	19 (63.34)
02	Agree	08 (26.67)	06 (20.00)
03	Neither Agree nor Disagree	05 (16.67)	01 (03.33)
04	Disagree	06 (20.00)	03 (10.00)
05	Strongly Disagree	01 (03.33)	01 (03.33)
<b>Total</b>		<b>30 (100.00)</b>	<b>30 (100.00)</b>

Table 10 outlines and stresses that the farms are facing only two constraints. Among the two, the priority goes to the Varieties which are Suitable to our soils are not available. Only the Andhra Pradesh varieties are being used by the farmers. Though the Citrus Research Station, Sankarankovil of Tamil Nadu Agricultural University is doing research on Citrus that are suitable to local conditions, the varieties released by the station were not percolated to the farms of Tiruchirappalli District and the farms are using only the Andhra varieties. Citrus Research Station, Sankarankoil, Tamil Nadu was established in 2016 and as such few varieties were released in acid lime, however efforts are to be taken to transfer the technology to the potential areas under Citrus. Around 54 per cent of the farms are agreeing that the varieties are not available and the technology transfer measures are also not practiced to the fullest extent in Citrus which was also reported by 83 per cent of the sample farms. Hence, the Krishi Vigyan Kendras which are nearer to the production site should concentrate on Technology Transfer measures to boost the area under Citrus as well as its production and productivity.<sup>2-9</sup>

### Conclusions and policy implications

With respect to Citrus, the higher area is prevailing in Maharashtra and Andhra Pradesh and they are the forerunners in establishing

Citrus. Madhya Pradesh and Rajasthan are the two states whom are making all the efforts to enhance the area under Citrus. In respect of productivity of Citrus, the national productivity is two times higher when compared to the productivity attained by Tamil Nadu. Low productivity prevailing in Tamil Nadu was mainly due to the absence of suitable varieties in Citrus to the local soil conditions and poor transfer of technology in Citrus were found to be the main reasons. Hence, the Citrus Research Station, Tamil Nadu should make concerted efforts to develop the best-suited varieties in Citrus and the same may be made available through the appropriate technology transfer measures.

### Acknowledgments

None

### Conflicts of interest

There is no conflict of interest.

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