Critical evaluation of production – import – export of lentils in India: an issue of food security

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Short Report

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Critical evaluation of production – import – export of lentils in India: an issue of food security

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Abstract

Pulses has the ability of withstanding extreme weather conditions, requires less water, has the capability of atmospheric nitrogen fixation, and is an affordable eminent replacement of animal proteins, especially for the economically weaker population. For a country like India, promising only around 47.9 g/capita/person/day of pulses of recommended 80 g/capita/person/day by National Institute of Nutrition (2011), the protein on the plate is not sufficient for sure. India, standing second in worldwide lentil production, in 2017-18 had the highest production of lentils between 2010-11 to 2019-20. Our analysis strongly depicts that in the decade (2010-11 to 2019-20) the production, import and export relation is not synchronised which robustly indicates that lentil cultivation, which seems to be in fair state, should be undoubtedly handled effectively to avoid threat in pulse circulation in India and globally. Also, before reaching any unprecedented agricultural hazard and to achieve total food security of

lentils, it is obvious to look into the parameters which directly or indirectly affect lentil production and distribution throughout the country. Thus, we predict that efficacy of policy making of lentil security will have beneficial implementations on the economically deprived population in the rural India.

Introduction

Pulses (family: Fabaceae) has the ability of withstanding extreme weather conditions, requires less water, and have the capability of atmospheric nitrogen fixation, thus enabling it to be a highly desired crop for the marginal farmers. Pulses, specifically lentils (*Lens culinaris*), a rabi pulse containing 25% protein (considerably high than other average pulses) are consumed widely throughout the world and is considered as an affordable plant-based protein source. However, in a country like India, ranking 101st among the 116 countries in world hunger index, the protein on the plate is not sufficient for sure (The Hindu, October 14, 2021). There is no doubt for animal proteins as a source of essential amino acids, but the higher prices and considerable drive towards veganism inhibits them to add them in a daily diet of an average incoming Indian household, pushing us to choose the plant-based proteins. Lentils, along with dried beans and peas are the most common pulses consumed in the world (UNO), and is a well-known household name in India too. As decided at the World Food Summit 1996, "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". A great item like lentil, staple not only in the world but also in India requires an established, well-planned food security initiative to overcome the nutritional imbalance specifically for the economically weaker section.

The year 2017-18 has the highest production of pulses in the last decade. Out of 279.51 million tons of food grains cultivated in India in 2017-18, pulses were only 24.51 million tons, sharing only 8.77% to the total food grain production. In 2017-18, Kharif pulses contributed 36.75% to total pulse production, whereas Rabi Pulses had a share of 63.25%. Among all the other Rabi pulses, Lentil holds a 6.85% share. (Agricultural Statistics at a Glance 2020, Government of India, Ministry of Agriculture and Farmers Welfare, Department of Agriculture, Cooperation and Farmers Welfare, Directorate of Economics and Statistics). 2017-18 holding its importance, lentil recorded a production of 1.61 million tons from area of 1.55 million hectare at a productivity level of 1034 kg/ha, the ever-highest yield level. Leading six lentils producing

states have been Madhya Pradesh (0.68 million tons), Uttar Pradesh (0.50 million tons), West Bengal (0.15 million tons), Bihar (0.14 million tons), Jharkhand (0.06 million tons) and Rajasthan (0.03 million tons).

The net availability of pulses recorded in 2020 in India was 47.9 g/capita/person/day (Directorate of Economics and Statistics, DAC&FW) whereas the National Institute of Nutrition (2011) recommends 80 g/capita/person/day of availability. Still, after being the largest producer of pulses and second largest in lentils worldwide, the growing demand–supply gap for India has been a concern leading to strike in prices, and further resulting in this good source of plant protein quite inaccessible to the poor. The demand-supply gap is expected to grow further if the level of production of pulses is not increased. Lentil, a pulse and an economically accessible good source of plant protein is lacking in its way towards food security in current days. The aim of the study is to elucidate over the time from 2010-11 to 2019-20 to systematically analyze the agricultural data that where India stands in terms of food security of lentils. The data is relevant for the policy makers and the stake holders to decide more scientifically while taking decisions in order to regulate the import and export of lentils in India. This study was done during the pandemic in 2021. Data were collected from various published reports and data sheets online from the Government records.

Materials and Methods

Data were collected from various published reports and data sheets online from the Government records. Data regarding area, production, productivity were collected from "Agricultural Statistics at a Glance 2020" published by, Government of India, Ministry of Agriculture and Farmers Welfare, Department of Agriculture, Cooperation and Farmers Welfare, Directorate of Economics and Statistics. The import and export data were extracted from FAOSTAT database (https://www.fao.org/faostat/en/#home). Data concerning Birbhum was collected from Rathindra Krishi Vigyan Kendra, Palli Siksha Bhavana (Institute of Agriculture), Visva Bharati University and Department of Agriculture, Birbhum district, Government of West Bengal (https://birbhum.gov.in/agriculture/). After compiling and arranging the data accordingly, the under described analysis was carried out.

Results

The year 2017-18 has been of major interest because of its abundant returns. The total world acreage under pulses in same year was about 85.40 million hectares with production of 87.40

million tons at 1023 kg/ha yields level. India, with >29 million hectares pulses cultivation area, is the largest pulse producing country in the world. In India during 2017-18, pulses were cultivated over >29 million hectares of area and recorded the highest ever production of 24.51 million tons at a productivity level of 841 kg/ha, ranking both first in area and production of pulses with 35% of global acreage and 25% of world production (Govt. of India, Directorate of Pulses Development). At the start of the decade in 2010-11 and 2011-12, both production and import were seen to rise, with a small peak in production in 2012-13. But from next year 2013-14, production has been stagnant till 2015-16 however import took a steady rise in 2014-15. From 2016-17 when production starts to take a stiff increase, imports also seen to reach a peak in the same year (Fig. 1). The year 2017-18, reaching the peak for production, ever-highest in the decade, where imports go down, touching the ever-lowest imports in recent past. Summarizing all these is the trend of daily demand of pulses as recommended by National Institute of Nutrition, 2011 which does not exclude lentils. The daily availability of pulses, 47.9 g/capita/person/day, 2020 desperately fails to go even closer to the recommendation of 80 g/capita/person/day (Fig. 2).

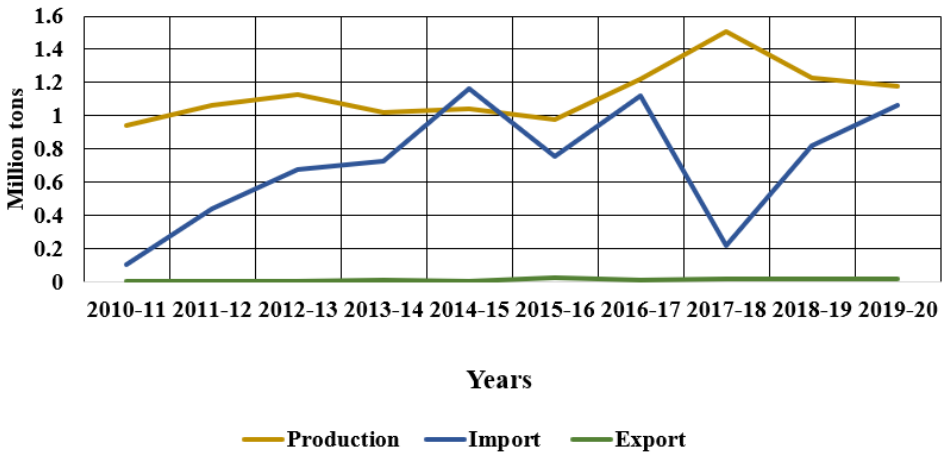

Fig. 1: Production, import and export of lentils in India over years

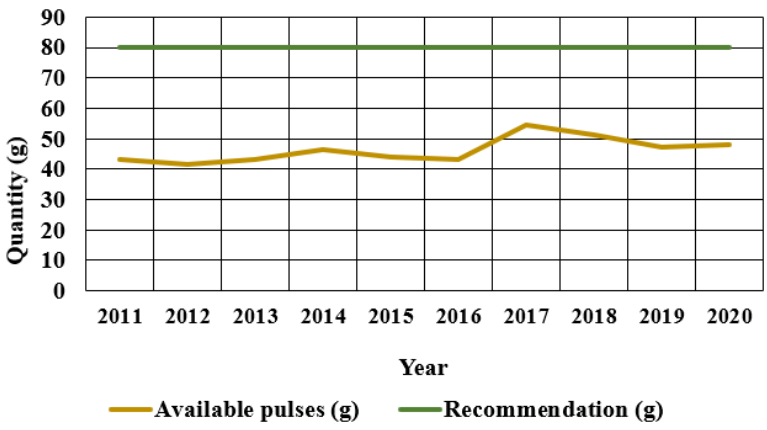

Fig. 2: Graphical representation of available and recommended availability of pulses

Discussion

The trend of production hike seen in 2017-18 has not being steady, as production declines from next year onwards, letting imports go higher again. In all through these years, export does not seem to be affected, neither rising nor lowering, has been maintaining a fair stagnant pace. These trends of inconsistent pattern of import, export and production does not imply any steady interrelation and appears to be fairly unstable. It is always expected to have a more or less formulated relation between import and production of any crop in any nation and certainly the export also is regulated depending upon the production rate.

The recommendation of 80 g/capita/person/day has never ever been met in the last decade, describing the efficiency and ability of production, and the situation of food and nutritional security of pulses, especially lentils, which is not only far but very tough to achieve too. (Fig. 2) Thus, very well indicating that, lentils, despite of the raise in production in the recent years, it is not enough to meet the demand of the population.

Well, in comparison to cereals, there is a widespread belief that pulses have a low yield potential and are a physiologically inefficient, as pulses have a lower harvest index (15-20%), in comparison to cereals (45-50%) (Malo & Hore, 2020). Inter-plant competition (indeterminate growth) causes low photosynthesis, resulting in poor partitioning to yield components, which reduce grain yield of the crop. Being the largest producer of pulses and second largest in lentils worldwide, after India's huge achievements in rice and wheat production, it is time for the same in pulses. We are emphasising some points in very brief to address this situation of massacre.

1. *Bringing additional area under pulses*

Uplifting of pulses from marginal lands and diversification of rice-wheat system in Indo-Gangetic plains (IGP) through popularization of short duration varieties of pigeon pea, Kabuli, chickpea, field pea and summer mung bean is needed through promotion of pulses in intercropping (utera, pyra) viz., short duration thermo-insensitive varieties of Pulses with spring sugarcane; pre-rabi chickpea with mustard/linseed; pigeonpea with groundnut/soybean/millets, etc.

2. *Improving productivity and supply of quality seeds*

The non-availability of seeds of high-yielding varieties in the desired quantities is perhaps one of the major constraints in the expansion of pulses. Research work on breeding superior, early maturing, high yielding, disease and pest resistant varieties of major pulse crop is needs to be initiated. Exploiting and utilizing gene-pool from unexplored areas, wild relatives for transfer of genes of interest with special emphasis on development of high yielding short duration varieties having multiple and multiracial resistance to diseases with ensuring direct supply of these seeds to the farmers (Malo and Hore, 2020).

3. *Adoption of proper agronomic practices*

Improving the view of negligence with tillage, crop geometry, plant population, planting method and time, nutrient and water (rainwater and irrigation) management, seed treatment (with fungicides) and crop-specific bacterial cultures, weed management, and plant protection are all agronomic practises that have a significant impact on pulse productivity is to be taken good care of with use of proper rhizobium culture.

4. *Efficient transfer of technology and policy intervention*

In order to increase the production of pulses in India, farmers must participate actively in the cultivation of various pulses while also adopting improved technology. Organizing farmer training and exposure visits, as well as mass media promotion of improved technology is needed with collaboration between research organisations, state agriculture departments, and private agencies to exploit pulse production as a cash crop in nonconventional areas. Promotion and awareness of information and communication technology-based management to boost smallholder farmer production and productivity.

Prospects for West Bengal: Birbhum, future directions

Among the 29 states, in 2017-18, West Bengal had production of 0.15 million tons, contributing 6.71% to the national area of production and 6.59% to the national production. According to Sekhon et al. (2009), the demand for pulses for household consumption were projected at 15.51 million tons in 2011, 20.16 million tons in 2021 and expected to rise up to 25.73 million tons in 2030 at a 4% rate of growth of Gross Domestic Product (GDP) at factor cost of 2004-05 prices. Though, at a higher growth rate of GDP of 7% at the factor cost of 2004-05 prices, the total demand for pulses becomes 38.97 million tons in 2030. The projection of Singh et al. (2013) is demonstrating that in case of West Bengal, the projected decadal growth in pulse productivity should be increased to achieve the proposed requirement (Table 1, Table 2) (Ray et al. 2018).

Table 1: Projected production, productivity, requirement and import of India and West Bengal by 2050 (Singh et al., 2013)

State	Production (Mt)	Productivity (Kg/ha)	Requirement (Mt)	Import (Mt)
India	26.06	979.6	27.68	1.02
West Bengal	0.27	1450.9	2.09	1.82

Table 2: Projected decadal growth in pulse productivity in West Bengal (Singh et al., 2013)

Year	Productivity (kg. / ha)
2010-11	833.3
2020-21	950.3
2030-31	1272.4
2050-51	1450.9

As per the data collected from Directorate of Economics & Statistics, DAC&FW, West Bengal, Among the 29 states, in 2017-18, had its fair share in production with 0.15 million tons, 0.14 million tons in 2018-19, 0.16 million tons in 2019-20 (estimated), still each year's yield lowering than each year's national yield, thus generating yield gaps.

In the state, the district of Birbhum is also no exception, as the production has increased magnificently with the gradual increase in area past years, but the yield has not increased much (Table 3).

Table 3. Area, yield and production of Birbhum over years: (Department of Agriculture and Allied, Government of West Bengal)

Year	Area (Ha)	Yield (Kg/Ha)	Production (Mt)
2011-12	6570	618	4060.26
2012-13	10026	623.3	6249
2013-14	10908	830	9053.64
2014-15	10530	825	8687.25
2015-16	13170	785	10338.45
2016-17	15525	1100	17077.5
2017-18	17150	1250	21437.5
2018-19	21155	1062	22466.61
2019-20	21355	1076	22978

Table 4. Yield gaps in Birbhum: (Mandal et al. 2018)

Variety cultivated	Existing yield	Yield gap (Kg/ha) w.r.to			New variety	Average yield	Yield gap minimized (%)		
Asha	7.5	District yield	State yield	Potential yield	Subrata, Moitree (With improved tech.)		District yield	State yield	Potential yield
		80	180	850			69.3	30.8	6.5

The stagnant nature of yield over years concludes in yield gaps, because of the cultivated varieties, as shown in Table 4. Better improved varieties like Subrata (WBL-58) and Moitree (WBL-77) has been proposed instead of existing low yielders i.e., Asha, minimizing yield gaps with better B:C ratio. (Mandal et al. 2018).

The rationale behind concentrating behind Birbhum is to do a case study in the rural area to analyze the scenario of lentil cultivation in rural India and analyze effective parameters underlying this massive agricultural production.

In future we desire to do a study in the district of Birbhum as Birbhum is one of the promising districts in lentil cultivation in the state.

Conclusion

Lentils in India is no doubt one of the excellent staple food items which we are highlighting in terms of mitigating the nutritional (protein) deficiency. But the food and nutritional security, already far too slow, is showing signs of stagnating or even being reversed

(globalhungerindex.org). To fulfil the growing demand in the country, dependence on imports is prevalent. Even with recent boost in production, amount of import does not subside. After the hit of the Covid 19 pandemic, the upwards urge for proteinaceous food and even with the driving demand towards plant-based diet, and young population's vision towards veganism – even if not all these, the economically weaker section's reliability on pulses for protein intake because of their economical inaccessibility towards meat-based protein, lentils definitely can/serves as a good alternative. The demand-supply gaps are expected to rise if the situation is not addressed immediately resulting in price hikes, thus disadvantaging the underprivileged. To conclude, lentils are an excellent source of proteinaceous food and item to a hunger free healthy world, after analysing the reported data, we have the inference that despite of good production of lentils throughout Indian subcontinent it is an issue of concern of agriculturists to make it to a more viable and economically sustainable and agriculturally sustainable pulse. In fact, it can be predicted that as the efforts in rise of production, past few years, has not been sufficient enough to subside the importation to meet the population demand it can be a cause of stress for nation after few years and immediate necessary action should be taken by the policy makers specifically regarding lentils to avoid sudden and unprecedented agricultural threat. At last, a strong vision is needed for bringing more land under lentil production and increasing production with encouragement to farmers with better returns in order to economically sustain the economically weaker population and crop-specific and region-specific approaches are needed to increase the area and production of pulse crops, which should be implemented within the overall framework of a systems approach. There are undoubtedly certain factors which directly or indirectly impact lentil production importation and exportation in any nation. It is a high time and a matter of concern for pulse researchers and policymakers to scrutinize the factors and implement global ultra-modern methodologies to stabilize the import export production equation.

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Authorship

SP, DB, UD and CM conceived the idea and designed the study. SP conducted data gathering. AK performed statistical analyses. SP, CM and UD wrote the article.

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Conflicts of Interest

The authors declare there are no conflicts of interest.

Ethical Approval

Not applicable

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