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Millets in India: Production, Consumption and Impact on Food Security

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Millets are a rich source of nutrients and these are hardy crops as well. The cultivation of millet has declined in the country since the government focused on fine cereals and suitable policies were not there for millets. The study focused on the area, production and productivity of jowar, bajra, ragi and small millets. The largest producing states of small millets, jowar, bajra and ragi are Uttarakhand, Maharashtra Rajasthan and Karnataka, respectively. From 1950-2021 the area under small millets, jowar, bajra and ragi has declined with CAGR of -3.60 %, -1.86 %, -1.27 % and -0.60%, respectively. The production of the small millets and jowar has declined with growth rates of -2.89% and -0.63 %, respectively. Production of bajra showed a growth rate 0.12 % per annum

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from 1950-51 to 2020-21 and ragi production increased with growth rate of 1.68%. Decomposition analysis indicated that production of ragi and bajra increased due to the yield effect and that of jowar and small millets increased due to areas effect. The consumption of these millets in the rural as well urban area has declined over the years. Thus, there is need of promoting awareness among the farmers and consumers about the importance of millets in a healthy diet which could increase their demand and consumption. This can be done through various means such as training programs, workshops, and awareness campaigns. The government could provide incentives and subsidies to farmers to encourage the cultivation of small millets.

Keywords: Food security; millets production; nutrients; decomposition analysis; healthy diet.

1. INTRODUCTION

Millets are the super food, the farm to fork value chain need serious efforts and upgradation. Millets are a group of small-seeded grasses that are cultivated as food crops around the world. They are a staple food in many parts of Africa and Asia and are consumed in a variety of forms, including porridge, bread, and fermented beverages. Millets are known for their nutritional value, as they are rich in protein, fiber, vitamins, and minerals such as iron, magnesium, and phosphorus. They are also gluten-free, making them a great option for those with gluten intolerance. Millets are also a more sustainable crop option than other major cereal crops like wheat and rice, as they require less water, fertilizer, and pesticides. Millets are nutrient dense the scientific studies have shown that the millets reduce the Iron deficiency, risk of type II diabetes, BMI and obesity, calcium deficiency.

Cultivation of millets is not only important just because for their high nutritious value, but also these are hardy crops that require very little water, fertilizer, and pesticides compared to other major cereal crops like wheat and rice. They are also more resistant to pests and diseases, making them a more sustainable crop option. Millets are more resilient to drought and other extreme weather conditions, making them an important crop option in areas prone to climate change-induced droughts and water scarcity. Growing millets has economic significance as they are often grown by small-scale farmers in developing countries, providing them with a source of income and food security. In addition, millets are also increasingly being recognized as a potential export crop, providing a boost to the economies of countries that grow them. However, the primary concern associated with millet production is the shrinking of global millet cropping area. Lack of improved varieties, agricultural inputs, and policy support are all limiting factors contributing to lower millet productivity and shrinking area. Millets as future gold crops will require well-planned and long-term public sector investment in multidisciplinary research activities by major growing countries (Meena et.al. 2021).

There are nine millets grown in India. The major millets are sorghum, pearl millet and finger millet covering 95 % of the total millet growing area in India and the remaining 5 % are little millet, foxtail millet, barnyard millet, proso millet, kodo millet and browntop millet.

Government of India has announced year 2023 as the International Year of Millets to raise awareness about the health and nutritional benefits of millets, promote their production and consumption, and highlight their potential contribution to food security, climate change adaptation, and sustainable agriculture.

Millets were officially declared Nutri Cereals in 2018 which was declared the National year of Millets. India also brought millets on the global scene by getting UNGA as an International Year of Millets.

Millets are an important crop that has been cultivated for thousands of years, especially in regions with marginal lands and harsh climatic conditions. However, their consumption and production have declined in recent decades due to a shift towards more modern and processed foods. The International Year of Millets aims to reverse this trend by promoting millets as a nutritious, healthy, and sustainable food option. India is the highest producer of millets in the globe.

The millets cultivation decreased during the late colonial period as it was replaced by wheat and other cash crops. The cultivation of jowar and bajra declined from a growth rate of 0.8 % and 0.78 %, respectively, between 1891-1901 to -0.97 % and 0.2 % at the end of 1940. The

decline in millet cultivation was due to the increasing demand for other crops, such as wheat, oilseeds, and cotton [1]. The area under millets has declined drastically over the years. NSSO Consumer expenditure survey revealed that bottom 25 % of households consumed around 1.59 kg millets per month per capita during 1993-94 which was maximum among all expenditure classes which has reduced over the years.

The International Year of Millets also aims to foster partnerships and collaborations among governments, farmers, research institutions, civil society organizations, and the private sector to support the production and consumption of millets, and to share knowledge and best practices in millet-based agriculture and food systems. This article is aimed to portray the current status of millet production, consumption and various government initiatives and extension strategies to promote millets production in India.

2. METHODOLOGY

The secondary data were compiled on various aspects like area, production and yield of small millets, jowar, bajra and ragi for India. The data on the area, production and productivity of the millets were compiled from the Ministry of Agriculture and Farmer's Welfare from period 1950-2021. The data on the consumption of the millets was compiled from the various rounds of Consumption Expenditure Survey (CES) of National Sample Survey Organisation (NSSO) for the year 2000-01 to 2011-12. The information on the government initiatives for the millets was collected from the various published sources.

2.1 Compound Annual Growth Rate

$Y_t = AB^t$

Where, Y_t = area/ production/ yield of millets in t^{th} period
t = time variable (1,2,3….,n)
A = constant
B = (1+r)
r = compound growth rate

After log transformation and estimation of the above function as:

$\ln Y_t = \ln A + t \ln B$

Compound growth rate was estimated as:

$r = (\text{Antilog } B - 1) \times 100$

2.2 Decomposition of Growth Component

The change in the production of crop depends upon the change in area and average yield. The effect of the area, yield and their interaction is studied by many researchers like Singh and Chandra [2], Vatta and Aggarwal [3]. Thus to study the contribution of yield, area and their interaction in production of millets in country decomposition analysis was performed [4] and given as

$\Delta P = A_0\Delta Y + Y_0\Delta A + \Delta A\,\Delta Y$

Change in production = Yield effect +Area effect +Interaction effect

Production in base year is given by
$P_0 = A_0 \times Y_0$

Production in the n^{th} year is given by

$P_n = A_n \times Y_n$

Therefore, $P_n = A_n \times Y_n = (A_0+\Delta A)(Y_0+\Delta Y)$
$= A_0Y_0 + A_0\Delta Y + \Delta AY_0 + \Delta A\Delta Y$
$\Delta P = P_n - P_0 = A_0\Delta Y + Y_0\Delta A + \Delta A\Delta Y$

Where,

$A_0\Delta Y$ = Yield effect
$Y_0\Delta A$ = Area effect
$\Delta A\Delta Y$ = Interaction effect
A_0 = area in the base year
A_n = area in the n^{th} year
P_0 = production in the base year
P_n = Production in the n^{th} year
Y_0 = yield in the base year
Y_n = yield in the n^{th} year
ΔA = change in area ($A_n - A_0$)
ΔP = Change in production ($P_n - P_0$)
ΔY = Change in yield ($Y_n - Y_0$)

3. RESULTS AND DISCUSSION

Fig. 1 represents state wise area, production and productivity of small millets in India. The area under small millets is maximum in Madhya Pradesh (78 thousand ha) and production is maximum in Uttarakhand (71 thousand tonnes). The productivity is maximum in Puducherry (2375 kg/ha) followed by Gujarat (1541 kg/ha) and Uttarakhand (1449 Kg/ha). Madhya Pradesh, Uttarakhand, Maharashtra, Odisha and Arunachal Pradesh accounted for 50 % of the area under small millets in India. Three states namely Uttarakhand, Madhya Pradesh and Tamil

Nadu accounted for 50 % of the total production of the small millets in the country.

Fig. 2 represents area, production and productivity of jowar in different states of India. Among the world's cereal crops, jowar ranks fifth after wheat, rice, maize and barley. The area and production of jowar is maximum in Maharashtra i.e. 2078.9 thousand ha and 1746.61 thousand tonnes, respectively. Maharashtra cultivated around 50 % of total area under this crop. Andhra Pradesh has the highest productivity (3428 Kg/ha) of the jowar in the country. Jowar is very versatile crop grown both in Kharif and Rabi season in arid and semi-arid regions of the country.

Fig. 3 presented the area production and productivity of bajra in different states of the country. Rajasthan (4561.47 thousand tonne) is the largest producer of bajra followed by Uttar Pradesh. The area under bajra is maximum in Rajasthan i.e. 4348.4 thousand ha followed by Uttar Pradesh. Around 95 % of the production of the bajra is contributed by the six states namely, Rajasthan, Uttar Pradesh, Haryana, Gujarat, Madhya Pradesh and Maharashtra.

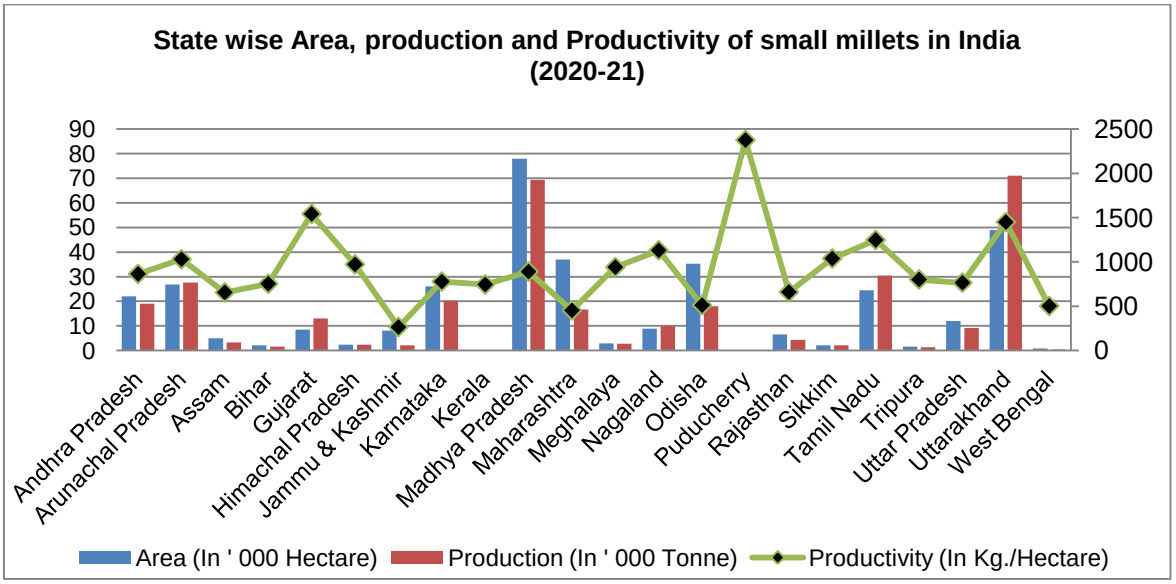


Fig. 1. State wise area, production and Productivity of small millets in India
Source: Ministry of Agriculture & Farmers Welfare, GOI

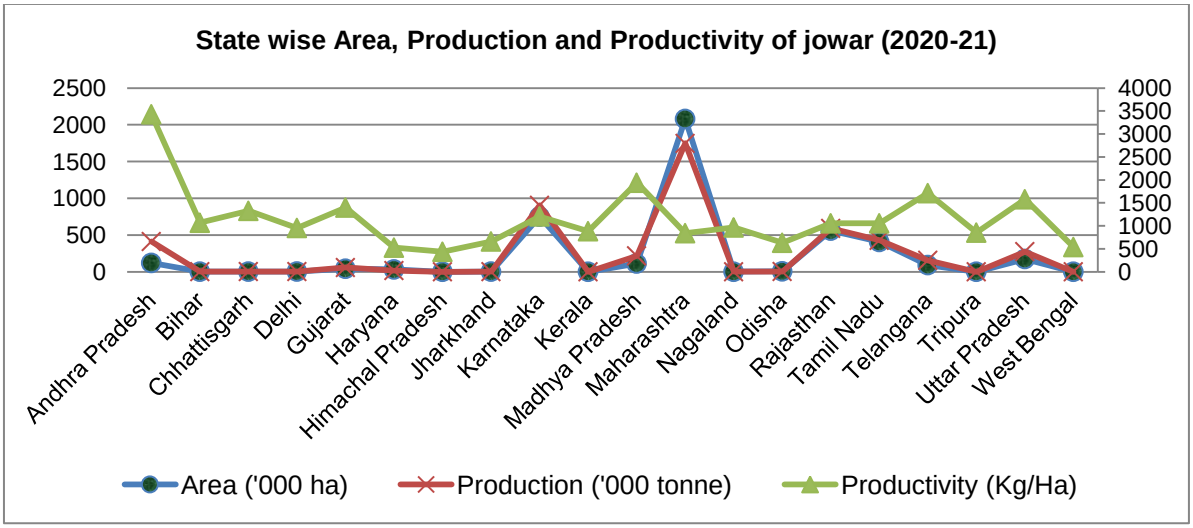


Fig. 2. State wise Area, production and Productivity of jowar in India
Source: Ministry of Agriculture & Farmers Welfare, GOI

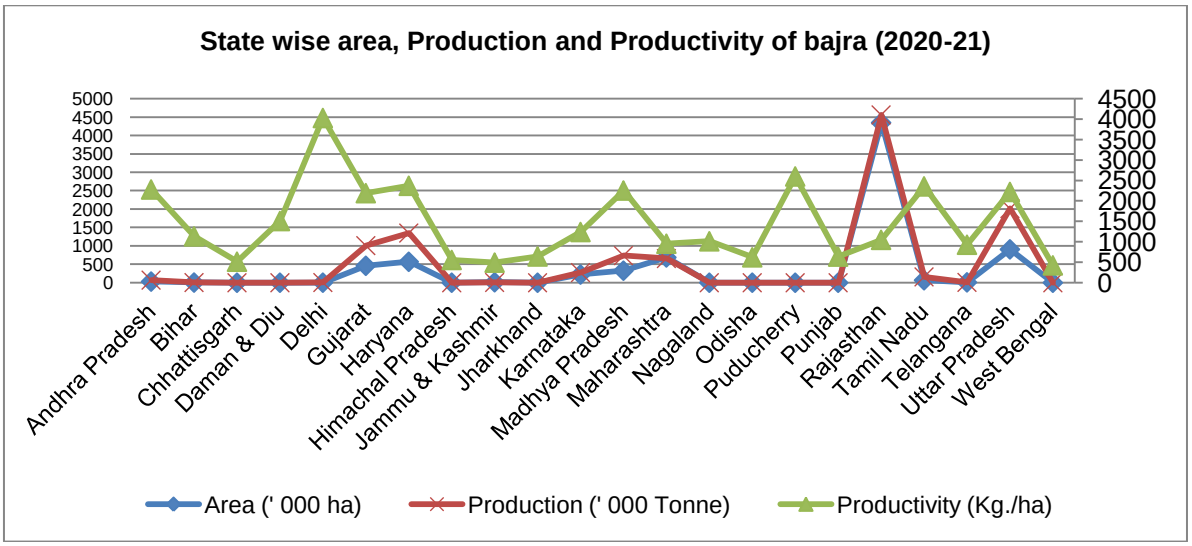


Fig. 3. State wise area, production and productivity of Bajra in India
Source: Ministry of Agriculture & Farmers Welfare, GOI

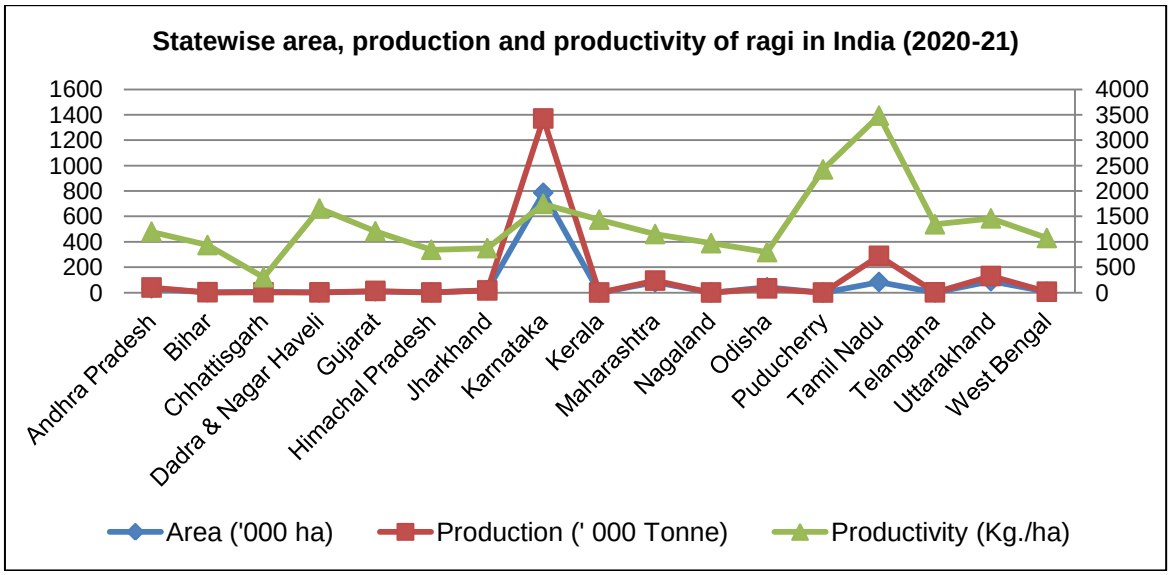


Fig. 4. State wise area, production and productivity of ragi in India
Source: Ministry of Agriculture & Farmers Welfare, GOI

Table 1. Compound annual growth rate of area, production and productivity of small millets in India

(Per cent)

Year	Area	Production	Productivity
1950-60	0.29	0.05	-0.24
1961-70	0.07	-0.88	-0.95
1971-80	-0.98	-0.40	0.59
1981-90	-4.45	-2.62	1.90
1991-2000	-4.45	-4.92	-0.50
2001-10	-5.09	-2.65	2.58
2011-20	-6.50	-2.56	4.22
1950-2021	-3.60	-2.89	0.74

Source: Ministry of Agriculture & Farmers Welfare, GOI

Fig. 4 shows that Karnataka has maximum area under ragi in country and contributes to the maximum production (1369.83 thousand tonne). Karnataka accounts for 68.55 % of ragi production in India. Tamil Nadu and Uttarakhand are the next major producers contributing 14.44 % and 6.50 %, respectively. Around 90 % of the total area under ragi and 95% of total production was contributed by four states namely, Karnataka, Uttarakhand, Tamil Nadu and Maharashtra.

The area and production of the small millets have declined with the growth rate of -3.60 % and -2.89 % per annum from 1950 to2021 however the productivity has increased by 0.74 % per annum (Table 1). Looking at the decadal growth of the small millets in country the area under small millets has increased with growth rate of 0.29 % and 0.07 % during 1950-60 and 1961-70, respectively and it declined thereafter in the successive decades. Further the production declined maximum by 4.92 % per annum during 1991-2000. The reason for the decline in the area and production of small millets has been attributed to the easy availability of the rice and wheat through PDS that resulted in food consumption away from the small millets in the producing regions in the country. The Cultivation of small millets declined from 4.61 million ha to 0.44 million ha during 1950-2021. Also low social status of small millet food, resistance to dietary habits and lack of knowledge on the use of small millets in daily diet were constraints in consumption.

Table 2 depicts the compound annual growth rate of area, production and productivity of the jowar in country during 1950-2021. The area under jowar declined with the rate of -1.86 % per annum during the given study period. The cultivation of the jowar declined to 4.38 million ha during 2020-21 from 15.57 million ha in 1950-51. The production of the jowar declined with the growth rate of 0.63 % per annum during 1950-2021. The decadal growth in the production of jowar revealed that production grew with growth rates of 4.46 %, .42 % and 4.96 % during 1950-60, 1961-70 and 1971-80, respectively. It declined by -3.19 % and -3.16 % during 1991-2000 and 2011-20, respectively. The major reasons for the decline in area and production were droughts in various growing regions, labour intensive, low productivity and high input costs. Also the use of machinery on the farms also attributed to the decline in the area under jowar as earlier farmers use its fodder for cattle.

Table 2. Compound annual growth rate of area, production and productivity of jowar in India (Per cent)

Year	Area	Production	Productivity
1950-60	1.10	4.46	3.31
1961-70	-0.12	0.42	0.52
1971-80	-0.12	4.96	5.10
1981-90	-1.59	0.12	1.75
1991-2000	-3.11	-3.19	-0.03
2001-10	-3.19	-0.24	3.06
2011-20	-4.38	-3.16	1.25
1950-21	-1.86	-0.63	1.25

Source: Ministry of Agriculture & Farmers Welfare, GOI

Table 3. Compound annual growth rate of area, production and productivity of ragi in India (Per cent)

Year	Area	Production	Productivity
1950-60	1.52	3.74	2.20
1961-70	-0.23	-0.14	0.10
1971-80	1.20	3.70	2.47
1981-90	-1.49	-0.95	0.55
1991-2000	-1.99	-0.35	3.50
2001-10	-2.71	0.69	3.50
2011-20	-1.55	-1.00	0.55
1950-2021	-1.27	0.12	1.41

Source: Ministry of Agriculture & Farmers Welfare, GOI

The area under ragi (finger millet) has declined by 1.27 % per annum during 1950-21 and the production and productivity have increased by 0.12 % and 1.14 %, respectively (Table 3). The decline in the area under cultivation of ragi was around 2.71 % per annum during 2001-10 which reduced to 1.55 % during 2011-20. This millet had seen growth in the past few years however, the crop is hit by the lack of farmer friendly procurement policy.

Table 4 represents the compound annual growth rate of area, production and productivity of bajra in India. Over the period of seven decades the area under bajra has declined by 0.60 % per annum, however the production has increased by 1.68 % per annum and productivity by 2.28 %. The area under bajra declined by 1.20 %, 0.93 % and 1.10 % per annum during 1971-80, 1981-90 and 1991-2000, respectively. The area under bajra cultivation declined from 10.77 million ha to 7.65 million ha from 1952-53 to 2020-21. This showed that farmers were not getting enough profits from the cultivation of these millets as the time of harvest ranges between three to four months. Also, to earn maximum profit the farmers have switched to the cultivation of cash crops and vegetables.

The total change in the production of small millets was decomposed into three effects i.e. area effect, yield effect and interaction effect (Table 5). The relative contribution of area, yield and their interaction in increasing the total production of small millets during 1950-60 was 14.48 %, 83.65 % and 1.10 % respectively which means the increase in production of this crop was due to the area effect (83.65%). During other decades that is 1961-70, 1971-80, 1981-90,1991-2000, 2001-10 and 2011-20 the contribution of the area effect on the production of the small millets was more compared to the yield effect and interaction effect. The results of decomposition analysis clearly indicated that area contributed majorly in increasing the total production of the crop in country during study period 1950-51 to 2020-21.

Table 4. Compound annual growth rate of area, production and productivity of bajra in India (Per cent)

Year	Area	Production	Productivity
1950-60	1.52	2.47	0.94
1961-70	1.71	6.03	4.25
1971-80	-1.20	-0.18	1.01
1981-90	-0.93	2.92	2.29
1991-2000	-1.10	-0.56	2.73
2001-10	0.07	2.09	2.03
2011-21	-0.82	0.95	1.79
1950-2021	-0.60	1.68	2.28

Source: Ministry of Agriculture & Farmers Welfare, GOI

Table 5. Per cent Contribution of area, yield and their interaction for increasing production of small millets

Year	Yield effect	Area effect	Interaction effect
1950-60	14.48	83.65	1.10
1961-70	3.93	57.72	-0.69
1971-80	-108.39	196.71	12.13
1981-90	-44.80	129.51	15.85
1991-2000	7.79	95.21	-2.48
2001-10	-109.74	166.55	42.77
2011-21	-164.16	190.49	72.82
1950-2021	-131.62	112.70	118.93

Table 6. Per cent Contribution of area, yield and their interaction for increasing production of ragi

Year	Yield effect	Area effect	Interaction effect
1950-60	44.17	49.51	6.26
1961-70	7.46	-25.21	-2.00
1971-80	53.76	42.97	2.22
1981-90	23.58	80.48	-3.97
1991-2000	484.22	-299.77	-84.34
2001-10	-238.00	286.02	52.17
2011-21	141.46	-40.43	-2.04
1950-2021	416.21	-119.08	-197.24

Table 7. Per cent Contribution of area, yield and their interaction for increasing production of jowar

Year	Yield effect	Area effect	Interaction effect
1950-60	64.89	23.22	11.84
1961-70	624.31	-506.58	-29.93
1971-80	123.86	-16.44	-7.15
1981-90	-379.03	427.80	51.20
1991-2000	-236.36	287.74	47.88
2001-10	-314.71	335.82	77.53
2011-21	-73.31	153.90	21.92
1950-2021	-1700.73	578.50	1222.54

Table 8. Per cent Contribution of area, yield and their interaction for increasing production of Bajra

Year	Yield effect	Area effect	Interaction Effect
1950-60	-2.62	137.41	-0.71
1961-70	76.92	12.05	11.15
1971-80	294.33	-218.47	-2.90
1981-90	199.23	-55.28	-22.11
1991-2000	-1656.31	68.20	32.71
2001-10	95.93	3.46	0.84
2011-21	372.31	-224.43	-47.72
1950-2021	123.54	-4.78	-18.77

Table 6 shows that the total production of the ragi has increased due to the yield effect (416.21%) during 1950-21. The decadal pattern of the decomposition analysis of Ragi revealed that during the period 1961-70, 1971-80, 1991-2000 and 2011-21 the total production has increased because of yield effect.

Table 7 reveals the decomposition analysis for jowar. During the period 1950-60, 1961-70 and 1971-80 the yield effect was 64.89 %, 624.31 % and 123.86 %, respectively hence the total production of jowar during these decades has increased due to the yield effect. Likewise, area effect was more during the period 1981-90, 1991-2000, 2001-10 and 2011-21 i.e. 427.80 %, 287.74 %, 335.82 % and 153.90 %, respectively on the total production of jowar in the country. During the period 1950-2021, yield effect, area effect and Interaction effect was -1700.73 %, 578.50% and 77.53 %, respectively.

For bajra the decomposition analysis revealed that during the period 1961-70, 1971-80, 1981-90, 2011-10, 2011-21 the yield defect has major impact on the total production of bajra as compared to area and interaction effect. During the study period 1950-2021 the yield effect has greater impact on total production compared to the other effects (Table 8).

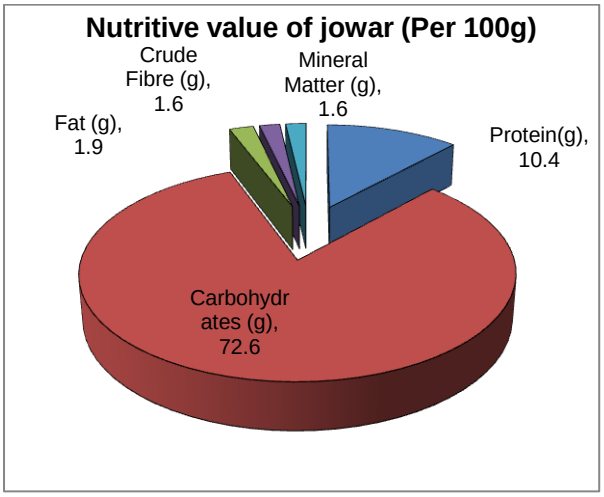
Table 9 revealed the shift in consumption of millets in the country from 2000-01 to 2011-12. The per capita per month intake of jowar in rural sector has declined from 0.39 Kg in 2000-01 to 0.201 Kg in 2011-12. And in urban areas the

intake has declined from 0.26 Kg to 0.139 Kg. For bajra the intake in rural areas increased from 0.33 Kg in 2000-01 to 0.45 Kg during 2003-04 and thereafter it declined to 0.246 Kg per capita per month in 2011-12.The intake of the small millets has fallen from 0.02 kg per capita per month to 0.04 Kg per capita per month in rural areas. The decline in the intake of ragi was

Table 9. Per capita consumption of millets in India (Kg /capita/month)

Year	Jowar		Bajra		Small millets		Ragi	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
2000-01	0.39	0.26	0.33	0.11	0.02	-	0.15	0.06
2001-02	0.44	0.31	0.36	0.13	0.02	-	0.14	0.08
2002-03	0.43	0.28	0.35	0.12	0.02	-	0.14	0.07
2003-04	0.47	0.27	0.45	0.13	0.02	-	0.14	0.05
2004-05	0.43	0.225	0.389	0.113	0.009	0.001	0.131	0.076
2005-06	0.33	0.22	0.31	0.11	0.01	0.001	0.13	0
2006-07	0.416	0.212	0.346	0.101	0.015	0.001	0.111	0.062
2007-08	0.365	0.215	0.389	0.107	0.008	0.001	0.095	0.061
2009-10	0.304	0.182	0.254	0.087	0.005	0.001	0.096	0.077
2011-12	0.201	0.139	0.246	0.091	0.004	0.001	0.075	0.06

Source: Various NSSO rounds



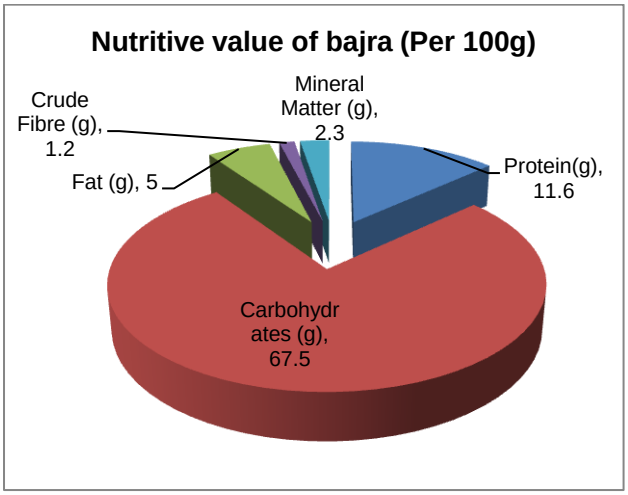


Fig. 5. Nutritive value of jowar

Fig. 6. Nutritive value of bajra

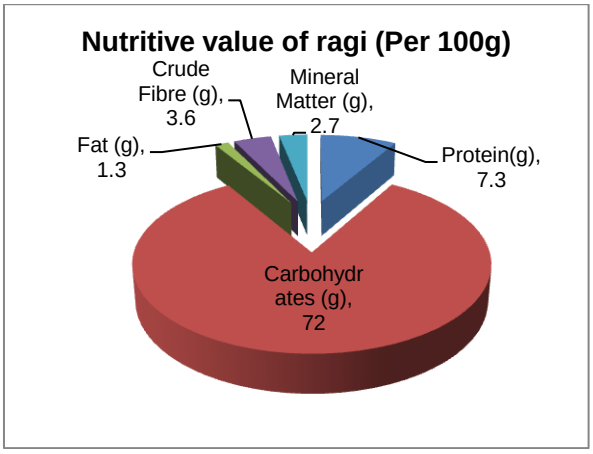


Fig. 7. Nutritive value of ragi

around 50 % during 2000-01 to 2011-12 in rural areas of the state. However, the urban households have showed a varied trend in the consumption of the ragi. This declined occurred because after Independence, India and other developing nations adopted the Western development model, abandoning many valuable and meaningful practices, including food habits. Indigenous foods are being forgotten in favour of standardization, and millets have been dismissed as too primitive to be helpful. As a result, state policies favouring rice and wheat have caused a sharp decline in millet production and consumption.

3.1 Nutritive Value of Millets

Millets have substantially high amount of proteins, fibers and minerals as compared to the other foodgrains (wheat and rice). Figs. 5, 6 ,7 presented the nutritive status of the Jowar, Bajra and ragi. The protein content in millets like jowar (10.4) and Bajra (11.6) is comparable with wheat and more than the rice [5]. Also almost all the millets contains more fiber content than fine cereals. The mineral matter of rice and wheat is 1.2 g and 0.2 g per 100 g, respectively. However the mineral content of jowar is 1.6 g, Bajra is 2.3 g and Ragi is 2.7 g per 100g (National Institute of Nutrition, Hyderabad). Millets control blood sugar and helpful for the people with diabetes, It improves digestive health, protects heart and reduces the risk factor for heart diseases.

3.2 Initiatives of Indian Government for the Promotion of Millets

Indian government's efforts to promote millet production and consumption are aimed at addressing the challenges of food security, nutrition, and sustainability in the country. By promoting millets, the government hopes to enhance the availability of nutritious and healthy food options, support small-scale farmers, and promote sustainable agricultural practices through various policies and initiatives.

In 2018, the Indian government launched the "National Program on Nutri-Cereals" to promote the cultivation of millets and other Nutri-cereals, such as sorghum and barley. The program aims to increase the area under Nutri-cereals cultivation, enhance their productivity and quality, and promote their processing, value addition, and marketing. The Indian government has also included millets in its public distribution system, which provides subsidized food grains to millions of people across the country. This move has not only increased the availability of millets but has also helped to improve their status as a nutritious and healthy food option.

In addition, the Indian government has been promoting millet-based farming systems, such as agro forestry and mixed cropping, which can help to increase soil fertility, conserve water, and reduce the use of chemical fertilizers and pesticides.

Government has initiated push to millet movement on various levels including mass awareness, enhancement of production & productivity, awareness regarding health and nutrition benefits, value addition, processing & recipe development, etc. by planning to include millets in Mid-Day Meal in schools and Anganwadis at least one day a week, Buffets at hotels to have millet focus at least one millet dish during 2023, Chefs to give online training modules build up to one platform for sharing dishes. Appeal to eat millets at least once a week, food influencers to share best experiences with millets. Promote *Vrat* recipes of millets and its compilation, Online platforms and delivery agents to popularize millets. NSS, NCC SHGs/FPOs organizing events in schools, colleges, universities regarding awareness of millets, FSSAI has developed standards for millet products. Millet Vending Machines in all public places. Ministries will serve only millet snacks in 2023. Improve the nutritional and status of communities by including millets in breakfast and evening snacks for 10 lakh women and children in selected districts. Mobile teaching, kitchens and encourage nutrition on wheels concepts. Engage Industry bodies Confederation of Indian Industry Encourage and support the print, social and electronic media. Defense Food and Research Lab to promote millets in Defense Police forces canteens. Government also prepared millet movements' blue print for 19 Ministries and published through ICRISAT, also displayed in India International Trade Fair New Delhi. Millets show cased in Dubai Expo (Feb 2022 along with FPOs Startups on Millets. Efforts also made on awareness of millet production by showcasing millets in different programmes like Kisan Mela. The initiatives of Government of India in association with the States to create demand of Millets for health benefits in India at Global level for better remuneration to the farmers, protection of resources (soil and water)

and creation of direct and indirect employment. To enhance production &productivity of Millets, strengthening quality seed chain fully support to Breeder Seed procurement is to be provided. Support to Foundation and Certified Seeds. Encouragement of millets through Public Private Partnership mode. Frontline technology demonstrations/ cluster demonstrations to be carried. Efforts planned in demand creation through awareness and increase of consumption. Crop Diversification focus in favour of millets planned. States will take steps for procurement of millets. To generate awareness regarding Health and Nutrition Benefits Government will initiate “Eat Right Campaign”. Steps taken to avail technology support for ICAR, SAUs and other like ICMR, NIN, AYUSH,IIMR, Central Food Technological Research Institute (CFTRI) & ICRISAT to research and collate evidence. Promote bio fortification of millets. Digital publication of papers on millets initiated to create awareness. To commission studies by National/ International reputed organizations. Awareness among mothers through Mothers Committees of Anganwaadi planned [6].

Year 2018 was celebrated as National Year for Millets for Nutri cereals like sorghum, jowar, pearl millet, bajra, finger millet, ragi, minor millets, proso millet, kodo millet, little millet and pseudo millets. Several states launched mission on Millets. Millets included under POSHAN MISSION Abhiyan by Ministry of Women Child Development. ICAR released one variety Quinoa (Him Shakti) Quinoa: A new crop, ICAR has been referred to suggest for declaring Nutri cereals. 200 Start-ups supported through IIMR, Hyderabad. Technology backstopping for 400 Entrepreneurs. 67 Value added Technologies developed at Centre of Excellences. Export of Millets increased from 24 million 2017 to 26 million 2020. 13 High Yielding varieties including 4 bio fortified varieties of millets were released [6]. Government of India has taken steps towards increasing production and productivity of the millets [4,7-10].

4. CONCLUSION

In conclusion, the four major small millets in India, namely jowar, bajra, ragi, and other small millets, were analyzed for their state-wise area, production, and productivity. Madhya Pradesh has the highest area under small millets, while Uttarakhand has the highest production, and Puducherry has the highest productivity. Among the four major millets, Maharashtra has the highest area and production of jowar, while Andhra Pradesh has the highest productivity. Rajasthan has the highest area and production of Bajra, with six states contributing to 95% of its production. Karnataka has the highest area and production of Ragi, contributing to 67% of the total production. The area under small millets has declined over the years, with a growth rate of -3.60% per annum, while the productivity has increased by 0.74% per annum. The decline in area and production of small millets has been attributed to easy availability of rice and wheat through PDS, resulting in reduced food consumption of small millets in the producing regions. Lack of knowledge on the use of small millets in daily diet and low social status of small millet food also contributed to the decline. Similarly, the area under jowar and Ragi has declined over the years, while the production has decreased or increased marginally. Droughts, low productivity, and high input costs were the major reasons for the decline in area and production. Lack of farmer-friendly procurement policy affected the growth of ragi in recent years. On the other hand, the area under bajra has declined by 0.60% per annum, but the production and productivity have increased by 1.68% and 2.28% per annum, respectively.

On the other line of concluding thought there is need of promoting awareness among the farmers and consumers about the importance of small millets in a healthy diet could increase their demand and consumption. This can be done through various means such as training programs, workshops, and awareness campaigns. The government could provide incentives and subsidies to farmers to encourage the cultivation of small millets. This could help in increasing the area under cultivation of small millets. Procurement policies need to be made more farmer-friendly to ensure that farmers get a fair price for their produce. This would incentivize them to grow more small millets. Investing in research and development could help in developing improved varieties of small millets that are resistant to drought, pests and diseases, and have higher yield potential. Developing value-added products from small millets such as millet-based snacks, breakfast cereals, and bakery products could increase their demand and consumption among consumers. Encouraging organic farming practices could help in reducing the input costs of farmers and also increase the demand for organic small millets in the market.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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