

The Millets

(Moving Towards Nutritional Security)

Eat Millets Stay Healthy

2023



Directorate of Extension

C.S Azad University of Agriculture & Technology, Kanpur

About The Nutritive Crops: Millets

(A movement of Millet in India)



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Foreword

India is primarily on agrarian economy where agriculture is estimated to account for over 17 per cent of 2.6 trillion USD economies. More than 330.5 million metric tons of food grains were estimated to be produced in 2023 from 55 percent of total cropped area. India produces about 11% cereals of the world and ranks third in production after China and U.S.A. Due to technological advancements, the output and productivity of other significant crops like minor millets have been supplanted with those of dominant crops like paddy, wheat, and maize. Major and minor millets are the two types grown in India. Sorghum, bajra, and ragi are among the major millets; foxtail millet, banyard millet, proso millets, little millets, kodo millet and brown top millets are minor millets. Major millets are grown in greater quantities in India than minor millets, although minor millets have a higher nutritional value.

Millets are a common food source for the people of Manipur, Meghalaya, and Nagaland. India's top three millets-producing states are Maharashtra, Rajasthan, and Karnataka. Millets are heavily consumed in rural Assam (18.82 kg/hsh/m) and Bihar (18.69 kg/hsh/m). Madhya Pradesh (84,000 ha.) has the highest area under minor millets cultivation, followed by Chhattisgarh (63,370 ha.), Uttarakhand, and (53,000 hectares). Madhya Pradesh saw the largest rise in production (74 000 tonnes), followed by Uttarakhand (70 970 tonnes), and Tamil Nadu (37,340 tons).

Millets are simple to adopt and can flourish in a variety of climate and soil conditions. In India, millets can be grown from June to November on loamy, well- drained soil. Minor millets are susceptible to frost and prefer warm environment with temperature between 20-35°C. Millets may be cultivated with less rainfall since they are crops that are fed by the rain. Major millets require 450 mm of rainfall whereas small millets only need 350 mm. Due to their higher energy and nutritional content minor millets are used as human food and animal feed. A good supply of proteins, fibers, healthy fats, and minerals including calcium, zinc, magnesium, phosphorus, and potassium are abundant in minor or small millets. Minor millets are advantageous for diabetics, persons with cancer, oxidative stress, obesity, celiac disease, and people with gastrointestinal diseases because they are gluten free grains.

The present edition entitled “**The Millets-Moving Towards National Security**” will prove to be very useful to promote and disseminate newer technology of millets to farmers to uplift of socio-economic status.

I congratulate Dr. R.K. Yadav, Director Extension in bringing out this publication for creation of demand for millets. I, also congratulate Dr. P.K. Singh, Director Research for his extraordinary efforts to bring this publication in useful manner. This book is expected to serve as one stop solution for millets production, their recipes and nutritional parameters for households, entrepreneurs and other stake holders alike.

(Anand Kumar Singh)
Vice Chancellor

Chandra Shekhar Azad University of Agriculture & Technology, Kanpur

Dr. Rajendra Kumar Yadav
Director Extension



Preface

Millets are important crops for dryland farmers; they are highly nutritious and are climate-compliant crops. But overall millet consumption in India has declined over the years. In order to revive the demand of millets in India. In this present era, consumers prefer high-quality foods with longer shelf life. They also look for products which are convenient to prepare as people are too busy in their daily schedule. Moreover, people have increased their tendency to eat a greater variety of foods both traditional and conventional. Efforts are being made to create awareness on the potential health benefits of millets which are recommended for obese, diabetic, celiac and other lifestyle diseases. Millets are a traditional staple food of the dry land regions of the world. They are nutri-cereals which are highly nutritious and are known to have high nutrient content which includes protein, essential fatty acids, dietary fibre, B-Vitamins and minerals such as calcium, iron, zinc, potassium and magnesium. They help in rendering health benefits like reduction in blood sugar level (diabetes), blood pressure regulation, thyroid, cardiovascular and celiac diseases. However, the direct consumption of millets as food has significantly declined over the past three decades. The major reasons of decrease in consumption is the lack of awareness of nutritional merits, inconveniences in food preparation, lack of processing technologies and also the government policy of disincentives towards millets and favoring of supply of fine cereals at subsidized prices.

Hence developing technology that makes millet value added products available as convenient to make and easy access at reasonable prices will find great demand and market particularly in urban places where there is growing conscious for nutritive intake of food. This book entitled “**The Millets (Moving Towards National Security)**” comprehensively deals with the millet production and nutritive value of the respective products. Most of compilation of nutritional studies is of the successful sorghum, bajra, ragi, foxtail millet, kodo millet, barnyard millets, little millets browntop millets value chain interventions. This publication hopefully would be used by progressive farmers and food entrepreneurs as it includes traditional and non- traditional food items that can replace regular rice and wheat recipes. Particularly in urban areas where there is considerable demand for nutrient rich and ready to cook foods, this publication may be valuable.

A handwritten signature in blue ink, appearing to be 'Rajendra Kumar Yadav'.

(Rajendra Kumar Yadav)
Director Extension

Chandra Shekhar Azad University of Agriculture & Technology, Kanpur

Dr P.K. Singh
Director, AES




Prologue

India is the leading producer of millets, accounting for approximately 80 percent of Asia's and 20 percent of global production. In Uttar Pradesh it is grown in area 10.83 lakh ha with 50 lakh tons production which is about 19.69% of the total production of millets in the country. For centuries, millets have been a key ingredient in Indian cooking, gracing our plates with nutritional benefits and incredible adaptability, but they have not garnered the same level of attention as other grains. In a visionary move, the Government of India proposed to the United Nations to declare 2023 as the International Year of Millets which was accepted by the UN General Assembly.

Millets also known as 'Shree Anna' hold the distinction of being one of the oldest foods and are a rich source of protein, fiber, minerals, iron, calcium, zinc and magnesium. It is a gluten free grain and contains vitamin B3 aiding in reducing cholesterol and triglyceride levels. Additionally, these super grains integrate seamlessly into multiple cropping systems, both under irrigation and dry land farming, owing to their short growing season,"

The need of the hour is to bolster millet production while also integrating it into the mainstream consumption basket. Millets provide a viable solution to address the challenges posed by climate change to food security, impacting food production, costs and overall security. With their climate resilient features, including adapt ability to a wide range of ecological conditions, minimal irrigation requirements, better growth and productivity in low nutrient input conditions and reduced vulnerability to environmental stresses, millets offer an alternative to combat the effects of climate change and provide farmers with a secure and sustainable income source.

The present edition will serve as a source of information for the capacity building of small scale millets farmers and entrepreneurs.


(P.K. Singh)



What is Millets ?

Millet is an ancient grain that people have enjoyed for thousands of years. Millet is also food for livestock and birds. It is becoming increasingly popular as it is fast-growing, drought-resistant, and requires low input.

Millet is a good source of protein, fiber, key vitamins, and minerals. The potential health benefits of millet include protecting cardiovascular health, preventing the onset of diabetes, helping people achieve and maintain a healthy weight, and managing inflammation in the gut. Millet is an adaptable grain. There are many simple ways to prepare it, making it easy for people with celiac disease to include this gluten-free grain in their diets.

There are more than 20 different types of millet. Some of the more common varieties include:

Types of Millets	
Major Millets	<ul style="list-style-type: none"> • Sorghum Millet • Pearl Millet • Finger Millet
Minor Millets	<ul style="list-style-type: none"> • Barnyard Millet • Proso Millet • Foxtail millet • Kodo Millet • Brown top Millet • Little Millet



Major and minor millets are the two types grown in India. Sorghum, bajra, and ragi are among the major millets; foxtail millet, barnyard millet, proso millets, little millets, kodo millet and brown top millets are minor millets. Major millets are grown in greater quantities in India than minor millets, although minor millets have a higher nutritional value. Millets are simple to adopt and can flourish in a variety of climate and soil conditions. In India, millets can be grown from June to November on loamy, well- drained soil. Minor millets are susceptible to frost and prefer warm environment with temperatures between 20-35°C. Millets may be cultivated with less rainfall since they are crops that are fed by the rain. Major millets require 450 mm of rainfall whereas small millets only need 350 mm. Due to their higher energy and nutritional content small millets are used as human food and animal feed. A good supply of proteins, fibers, healthy fats, and minerals including calcium, zinc, magnesium, phosphorus, and potassium are abundant in minor or small millets. Minor millets are advantageous for diabetics, persons with cancer, oxidative stress, obesity, celiac disease, and people with gastrointestinal diseases because they are gluten free grains





Potential of Millets and Varieties Grown

Millets are resilient, small seeded grasses group of cereal or grains grown for fodder and human consumption. Millets are adapted to a wide range of ecological conditions and thrive well in rain-fed and arid climate. These properties of millets make them agriculturally superior to other commercial crops. In addition to this, millets have nutritional superiority over other cereals for its micronutrient profile and bioactive flavonoids which makes them highly valuable. The high protein content of these grains makes them ideal for vegetarian and vegan population, largely based in the U.S., Europe and Asia Pacific. Millets (pearl millet and lesser millets) are cultivated in over 93 countries throughout the world. Sorghum is the most frequently grown millet, with 42.1 million hectares in 105 countries. In developing countries, particularly Africa and Asia, produce and consume 97 percent of millets and contributing to 26.6 percent of the world's millet growing area out of which Asia covers 83 percent of millet growing area. India is the world's largest millets grower and is majorly cultivated in Rajasthan, Uttar Pradesh, Gujarat, Madhya Pradesh, Haryana, Maharashtra, and Karnataka. Millets have been an integral part of diet in the population of Odisha, Madhya Pradesh, Jharkhand, Rajasthan, Karnataka, and Uttarakhand.

S.No	Biofortified Variety	Salient features
Pearl Millet		
1	HHB 299	Rich in iron (73.0 ppm) and zinc (41.0 ppm) in comparison to 45.0-50.0 ppm iron and 30.0-35.0 ppm zinc in popular varieties / hybrids
2	AHB 1200	Rich in iron (73.0 ppm) in comparison to 45.0-50.0 ppm in popular varieties/
3	AHB 1269Fe	Rich in iron (91.0 ppm) and zinc (43.0 ppm) in comparison to 45.0-50.0 ppm iron and 30.0-35.0 ppm zinc in popular varieties/ hybrids
4	ABV 04	Rich in iron (70.0 ppm) and zinc (63.0 ppm) in comparison to 45.0-50.0 ppm iron and 30.0-35.0 ppm zinc in popular varieties / hybrids
5	RHB 233 (MH 2173)	High iron (83ppm) and high Zn (46ppm)
6	RHB 234 (MH 2174)	High iron (84 ppm) and high Zn (41 ppm)
7	HHB 311 (MH 2179)	High iron content (83 ppm)
8	Phule Mahashakti	Rich in iron (87.0 ppm) and zinc (41.0 ppm) in comparison to 45.0-50.0 ppm iron and 30.0-35.0 ppm zinc in popular varieties/ hybrids
Finger Millet		
1	Vegavathi (VR 929)	High in grain Zn content (199.1%). It is high in Fe, Ca, protein content, dietary fibre and low in Tannin content.
2	CFMV 1 (Indravathi)	Rich in Ca (428 mg/100g), Fe (58 mg/kg) and Zn (44 mg/kg) in comparison to Ca (200 mg/100 g), Fe (25 mg/kg) and Zn (16 mg/kg) in popular varieties
3	CFMV 2	Rich in protein (6.41%), Ca (654 mg/100g), Fe (39 mg/kg) and Zn (25 mg/kg) in comparison to Ca (200 mg/100 g), Fe (25 mg/kg) and Zn (16 mg/ kg) in popular varieties
Little millet		
1	CLMV 1	Rich in protein (14.4%), Fe (59 mg/ kg) and Zn (35 mg/ kg) in comparison to Fe (25 mg/ kg) and Zn (20 mg/ kg) in popular varieties
2	SreeNeelima	Rich in anthocyanin (50.0 mg/100g), crude protein (15.4 %) and zinc (49.8 ppm) in comparison to negligible anthocyanin, 2.7% crude protein and 22-32 ppm zinc in popular varieties

Varieties of Shri Anna (Millets) developed by C.S.Azad University of Agric. & Tech., Kanpur

☞ Bajra	: Bajra Mainpur, A.S.-571	☞ Chena	: Bhawna
☞ Sanwa	: Anurag, Kanchan, Chandan	☞ Kodo	: KK-1 & KK-2
☞ Ragi/Manduwa	: Nirmal, K-13, K-65	☞ Kakun	: Nishchal
☞ Jwar	: Bundela, Vijeta, Mau T-1, Mau T-2		





Benefits of Millets Cultivation in India

- Millets are considered an adaptable smart climate crop by the farmers of India. Its yield success rates are much higher when compared to other crops since it is a very low maintenance crop. It requires little irrigation and no fertilizers at all are disease resistant and have good market demand.
- Millet has a Short growing season of about 65 days which allows it to be a part of multiple cropping systems in both rain-fed and irrigated areas.
- It acts as both – food and fodder.
- Millets are a good source of protein, fiber, and essential fats. Moreover, they are gluten-free due to which they prove beneficial for Diabetic patients, people having Cancer, Oxidative stress, obesity, Celiac diseases, Gastro-intestinal disorders, and also for patients with heart ailments.
- It is a rich source of minerals like iron, calcium, zinc, magnesium, phosphorus, and potassium.
- Millets help in reducing the atmospheric Carbon Dioxide and thus contribute to lowering climate change.
- They are able to form quick packaged yet nutritious food, which urges more customers to buy them, thus increasing their demand.
- They provides employment to many people due to the traditional methods of farming involved in their cultivation.
- The export and import of millets add to the overall economic growth of the country and also helps boost the GDP of the nation.

Health Benefits of Millets

➔	Helps to Protect against Heart Disease
➔	Prevents onset of Breast Cancer
➔	Reduce the chances of Diabetes
➔	Lowers Bad Cholesterol Levels
➔	Helps to optimize Kidney
➔	Helps in Reducing Blood Pressure
➔	Beneficial in detoxifying Body



State-wise Area, Production and Productivity of Small Millets in India (2020-21)

State/UTs	Area (In'000 hectare)	Production (In'000 tonne)	Productivity (in Kg/hectare)
Andhra Pradesh	22.00	19.01	864
Arunachal Pradesh	26.82	27.62	1030
Assam	4.97	3.26	656
Bihar	2.17	1.64	753
Chhattisgarh	84.62	21.83	258
Dadar & Nagar Haveli	-	-	-
Goa	-	-	-
Gujrat	8.46	13.04	1541
Himanchal Pradesh	2.41	2.34	972
Jammu & Kashmir	8.11	2.14	264
Jharkhand	-	-	-
Karnatka	26.00	20.23	778
Kerla	0.05	0.04	745
Madhya Pradesh	78.00	69.42	890
Maharashtra	37.00	16.72	452
Meghalya	2.89	2.72	941
Nagaland	8.83	9.98	1130
Odisha	35.25	18.01	511
Puducherry	0.06	0.15	2375
Punjab	-	0.00	-
Rajasthan	6.50	4.29	660
Sikkim	2.05	2.13	1038
Tamilnadu	24.47	30.51	1247
Telengana	-	-	-
Tripura	1.62	1.30	801
Uttar Pradesh	12.00	9.18	765
Uttrakhand	49.00	71.00	1449
West Bengal	0.76	0.38	502
India	444.05	346.95	781



State Wise Millet Production

Area, Production and Yield of Millets during 2017-18 to 2021-22

CROP: JOWAR Area (A) in lakh ha, Production (P) in Lakh tonnes and Yield (Y) in Kg/ha

State/UT	2017-18			2018-19			2019-20			2020-21			2021-22*			Normal		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Andhra Pradesh	1.40	3.00	2146	1.56	2.30	1475	1.55	3.89	2510	1.20	4.11	3428	0.77	4.11	3166	1.30	3.48	2689
Bihar	0.01	0.01	1066	0.01	0.01	1066	0.01	0.01	1067	0.01	0.01	1067	0.01	0.01	1067	0.01	0.01	1024
Chhattisgarh	0.04	0.05	1483	0.03	0.03	986	0.03	0.04	1403	0.02	0.03	1326	0.01	0.03	834	0.03	0.04	1394
Gujarat	0.91	1.25	1374	0.76	0.96	1278	0.49	0.67	1373	0.41	0.57	1398	0.43	0.57	1346	0.60	0.81	1348
Haryana	0.48	0.25	519	0.40	0.21	528	0.30	0.16	528	0.31	0.16	525	0.23	0.16	527	0.35	0.19	549
Jammu & Kashmir	0.00	0.00	667	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	667
Jharkhand	0.03	0.02	664	0.02	0.01	685	0.02	0.01	751	0.02	0.01	659	0.02	0.01	709	0.02	0.01	700
Karnataka	10.88	11.40	1048	9.43	8.92	945	8.27	9.87	1194	7.50	9.04	1205	6.23	9.04	1204	8.46	9.65	1141
Kerala	0.00	0.00	799	0.00	0.00	817	0.00	0.00	825	0.00	0.00	883	0.00	0.00	1448	0.00	0.00	871
Madhya Pradesh	2.70	5.70	2112	0.75	1.64	2189	1.08	1.65	1529	1.12	2.17	1938	1.24	2.17	1941	1.38	2.67	1935
Maharashtra	22.31	16.07	720	16.32	8.72	535	22.91	18.08	789	20.79	17.47	840	16.49	17.47	1038	19.76	15.56	787
Odisha	0.06	0.04	632	0.07	0.05	634	0.06	0.04	633	0.06	0.03	631	0.06	0.03	629	0.06	0.04	619
Rajasthan	5.16	3.01	583	5.64	4.70	832	6.43	4.56	709	5.60	5.90	1054	6.20	5.90	864	5.81	4.81	829
Tamil Nadu	3.86	4.31	1117	3.86	4.64	1204	4.50	5.20	1156	4.05	4.27	1054	3.97	4.27	735	4.05	4.54	1122
Telangana	0.67	0.73	1090	0.56	0.67	1202	0.88	1.24	1407	0.91	1.56	1711	0.67	1.56	1537	0.74	1.15	1560
Uttar Pradesh	1.69	2.15	1270	1.47	1.83	1247	1.68	2.27	1349	1.74	2.75	1578	1.71	2.75	1578	1.66	2.35	1416
West Bengal	0.00	0.00	450	0.00	0.00	0	0.00	0.00	528	0.00	0.00	538	0.00	0.00	537	0.00	0.00	474
Other #	0.04	0.04	933	1.52	0.04	921	0.04	0.04	927	0.03	0.03	945	0.03	0.03	820	0.33	0.04	112
All India	50.24	48.03	956	40.93	34.75	849	48.24	47.72	989	43.78	48.12	1099	38.08	48.12	1110	44.25	45.35	1025

*4th Advanced Estimates
Source: Directorate of Millets Development, Jaipur, Note: A=Area, P=Production and Y=Yield





State Wise Millet Production

Aea, Production and Yield of Millets during 2017-18 to 2021-22

CROP: BAJRA Area (A) in lakh ha, Production (P) in Lakh tonnes and Yield (Y) in Kg/ha

State/UT	2017-18			2018-19			2019-20			2020-21			2021-22*			Normal		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Andhra Pradesh	0.48	0.92	1927	0.22	0.23	1031	0.25	0.58	2328	0.31	0.71	2281	0.31	0.55	1782	0.31	0.60	1907
Bihar	0.04	0.05	1134	0.03	0.04	1134	0.03	0.04	1134	0.04	0.05	1134	0.03	0.03	1134	0.04	0.04	1134
Chhattisgarh	0.00	0.00	0	0.00	0.00	449	0.00	0.00	0	0.00	0.00	515	0.00	0.00	446	0.00	0.00	450
Gujarat	3.97	9.65	2430	3.92	8.93	2280	4.35	9.13	2098	4.60	10.09	2192	4.46	10.56	2368	4.26	9.67	2270
Haryana	4.50	7.21	1602	4.25	8.78	2068	4.93	10.19	2068	5.69	13.50	2372	4.83	11.20	2318	4.84	10.18	2103
Himachal Pradesh	0.00	0.00	734	0.00	0.00	730	0.00	0.00	1020	0.01	0.00	557	0.01	0.00	557	0.00	0.00	620
Jammu & Kashmir	0.13	0.07	590	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.03	0.01	590
Jharkhand	0.01	0.00	576	0.00	0.00	578	0.00	0.00	711	0.00	0.00	643	0.00	0.00	618	0.00	0.00	620
Karnataka	2.31	2.87	1241	1.84	1.76	957	3.22	3.67	1140	2.22	2.76	1241	1.47	1.71	1161	2.21	2.55	1154
Madhya Pradesh	3.10	7.55	2435	3.27	6.28	1921	2.96	6.57	2219	3.27	7.38	2256	3.43	8.69	2533	3.21	7.29	2275
Maharashtra	7.88	6.69	849	6.10	3.32	545	6.73	5.12	761	6.88	6.57	955	5.26	4.75	903	6.57	5.29	805
Odisha	0.02	0.01	619	0.02	0.01	622	0.02	0.01	620	0.01	0.01	622	0.02	0.01	615	0.02	0.01	620
Punjab	0.01	0.01	598	0.01	0.01	651	0.01	0.00	635	0.00	0.00	640	0.01	0.00	650	0.01	0.00	633
Rajasthan	42.36	37.53	886	41.80	38.08	911	42.87	46.86	1093	43.48	45.61	1049	37.36	37.51	1004	41.58	41.12	989
Tamil Nadu	0.63	1.44	2277	0.47	1.18	2517	0.67	1.85	2743	0.67	1.59	2357	0.60	1.57	2616	0.61	1.53	2502
Telangana	0.09	0.10	1057	0.08	0.04	497	0.09	0.10	1158	0.10	0.09	930	0.04	0.03	823	0.08	0.07	913
Uttar Pradesh	9.25	17.95	1940	8.77	17.79	2029	9.17	19.39	2115	9.07	20.14	2221	9.04	19.49	2156	9.06	18.95	2092
West Bengal	0.00	0.00	300	0.00	0.00	402	0.00	0.00	401	0.00	0.00	425	0.00	0.00	428	0.00	0.00	367
Other#	0.03	0.05	1743	0.27	0.18	674	0.12	0.10	829	0.16	0.13	848	0.16	0.12	751	0.15	0.12	792
All India	74.81	92.09	1231	71.05	86.64	1219	75.43	103.63	1374	76.52	108.63	1420	67.03	96.24	1436	72.97	97.45	1335

*4th Advanced Estimates

Source: Directorate of Millets Development, Jaipur, Note: A=Area, P=Production and Y=Yield





State Wise Millet Production

Area, Production and Yield of Millets during 2017-18 to 2021-22

CROP: RAGI

Area (A) in lakh ha, Production (P) in Lakh tonnes and Yield (Y) in Kg/ha

State/UT	2017-18			2018-19			2019-20			2020-21			2021-22*			Normal		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Andhra Pradesh	0.35	0.45	1277	0.32	0.43	1348	0.34	0.45	1320	0.33	0.40	1197	0.30	0.30	1000	0.33	0.40	1233
Bihar	0.04	0.04	994	0.03	0.03	1071	0.03	0.02	796	0.03	0.03	934	0.02	0.02	779	0.03	0.03	927
Chhattisgarh	0.05	0.01	250	0.08	0.02	214	0.06	0.01	253	0.05	0.02	302	0.03	0.01	300	0.05	0.01	257
Gujarat	0.12	0.11	896	0.12	0.10	804	0.12	0.10	862	0.10	0.13	1205	0.10	0.19	1899	0.11	0.12	1106
Himachal Pradesh	0.02	0.02	1056	0.02	0.02	1060	0.02	0.02	1170	0.01	0.00	842	0.01	0.00	842	0.01	0.01	1050
Jammu & Kashmir	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00
Jharkhand	0.19	0.18	972	0.14	0.11	805	0.15	0.13	875	0.19	0.16	874	0.19	0.17	878	0.17	0.15	885
Karnataka	7.78	12.86	1653	5.27	6.78	1285	6.41	11.64	1816	7.85	13.70	1745	8.49	11.33	1334	7.16	11.26	1573
Kerala	0.00	0.00	1272	0.00	0.00	1208	0.00	0.00	1225	0.00	0.00	1435	0.00	0.00	1661	0.00	0.00	1355
Madhya Pradesh	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00
Maharashtra	0.93	1.06	1145	0.80	0.93	1164	0.82	0.87	1061	0.82	0.94	1151	0.74	0.93	1264	0.82	0.95	1154
Odisha	0.43	0.33	767	0.37	0.25	690	0.36	0.26	731	0.41	0.33	796	0.55	0.44	795	0.42	0.32	760
Tamil Nadu	0.87	3.21	3714	0.79	2.56	3257	0.85	2.75	3247	0.83	2.89	3481	0.74	2.21	2972	0.81	2.72	3346
Telangana	0.01	0.01	1137	0.01	0.01	977	0.02	0.03	1581	0.01	0.01	1343	0.01	0.02	1853	0.01	0.02	1412
Uttarakhand	1.03	1.41	1367	0.92	1.10	1194	0.84	1.20	1430	0.89	1.30	1459	0.86	1.27	1478	0.91	1.26	1383
West Bengal	0.12	0.14	1130	0.03	0.03	895	0.03	0.04	1464	0.06	0.06	1073	0.05	0.06	1176	0.06	0.07	1133
Other#	0.02	0.03	1634	0.01	0.02	1345	0.01	0.02	1503	0.01	0.02	1488	0.01	0.02	1189	0.01	0.02	1450
All India	11.95	19.87	1662	8.91	12.39	1390	10.04	17.55	1747	11.59	19.98	1724	12.11	16.96	1401	10.92	17.35	1589

*4th Advanced Estimates

Source: Directorate of Millets Development, Jaipur, Note: A=Area, P=Production and Y=Yield





State Wise Millet Production

Area, Production and Yield of Millets during 2017-18 to 2021-22

CROP: SMALL MILLETS Area (A) in lakh ha, Production (P) in Lakh tonnes and Yield (Y) in Kg/ha

State/UT	2017-18			2018-19			2019-20			2020-21			2021-22*			Normal		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Andhra Pradesh	0.21	0.16	762	0.13	0.06	462	0.22	0.22	1000	0.22	0.19	864	0.14	0.11	786	0.18	0.15	804
Assam	0.05	0.03	584	0.05	0.03	587	0.05	0.03	619	0.05	0.03	656	0.05	0.03	620	0.05	0.03	613
Bihar	0.04	0.03	752	0.09	0.07	751	0.02	0.02	755	0.02	0.02	753	0.02	0.01	754	0.04	0.03	752
Chhattisgarh	0.89	0.21	236	0.86	0.29	332	0.63	0.19	300	0.85	0.22	258	0.52	0.26	503	0.75	0.23	311
Gujarat	0.13	0.16	1210	0.01	0.01	955	0.00	0.00	560	0.08	0.13	1541	0.12	0.23	1988	0.07	0.11	1535
Himachal Pradesh	0.04	0.03	807	0.05	0.04	810	0.05	0.05	890	0.02	0.02	972	0.02	0.02	972	0.04	0.03	872
Jammu & Kashmir	0.06	0.03	497	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.01	0.01	497
Karnataka	0.34	0.26	765	0.19	0.17	882	0.49	0.37	765	0.26	0.20	778	0.27	0.21	789	0.31	0.24	786
Kerala	0.00	0.00	719	0.00	0.00	726	0.00	0.00	754	0.00	0.00	745	0.00	0.00	1206	0.00	0.00	825
Madhya Pradesh	1.48	1.44	973	0.89	0.59	663	0.84	0.74	881	0.78	0.69	890	0.89	0.77	860	0.98	0.85	867
Maharashtra	0.42	0.21	496	0.47	0.21	453	0.41	0.22	536	0.37	0.17	452	0.44	0.17	396	0.42	0.20	466
Odisha	0.29	0.15	512	0.33	0.17	518	0.33	0.17	517	0.35	0.18	511	0.38	0.20	511	0.34	0.17	514
Rajasthan	0.10	0.07	701	0.10	0.11	1018	0.10	0.05	518	0.07	0.04	660	0.07	0.04	633	0.09	0.06	717
Tamil Nadu	0.25	0.31	1238	0.22	0.35	1573	0.26	0.37	1444	0.24	0.31	1247	0.23	0.27	1179	0.24	0.32	1335
Telangana	0.00	0.00	0	0.00	0.00	0	0.01	0.02	1711	0.00	0.00	0	0.00	0.00	0.0	0.00	0.00	1711
Uttar Pradesh	0.09	0.06	650	0.06	0.05	755	0.08	0.06	728	0.12	0.09	765	0.07	0.05	714	0.08	0.06	723
Uttarakhand	0.59	0.76	1288	0.56	0.70	1248	0.53	0.71	1339	0.49	0.71	1449	0.47	0.73	1559	0.53	0.72	1368
West Bengal	0.03	0.02	815	0.05	0.05	850	0.06	0.06	907	0.01	0.00	502	0.02	0.02	1134	0.03	0.03	885
Other#	0.43	0.45	1041	0.46	0.45	964	0.49	0.43	876	0.50	0.46	914	0.53	0.61	1162	0.48	0.48	993
All India	5.46	4.39	804	4.54	3.33	734	4.58	3.71	809	4.44	3.47	781	4.23	3.75	885	4.65	3.73	802

*4th Advanced Estimate

Source: Directorate of Millets Development, Jaipur, Note: A=Area, P=Production and Y=Yield



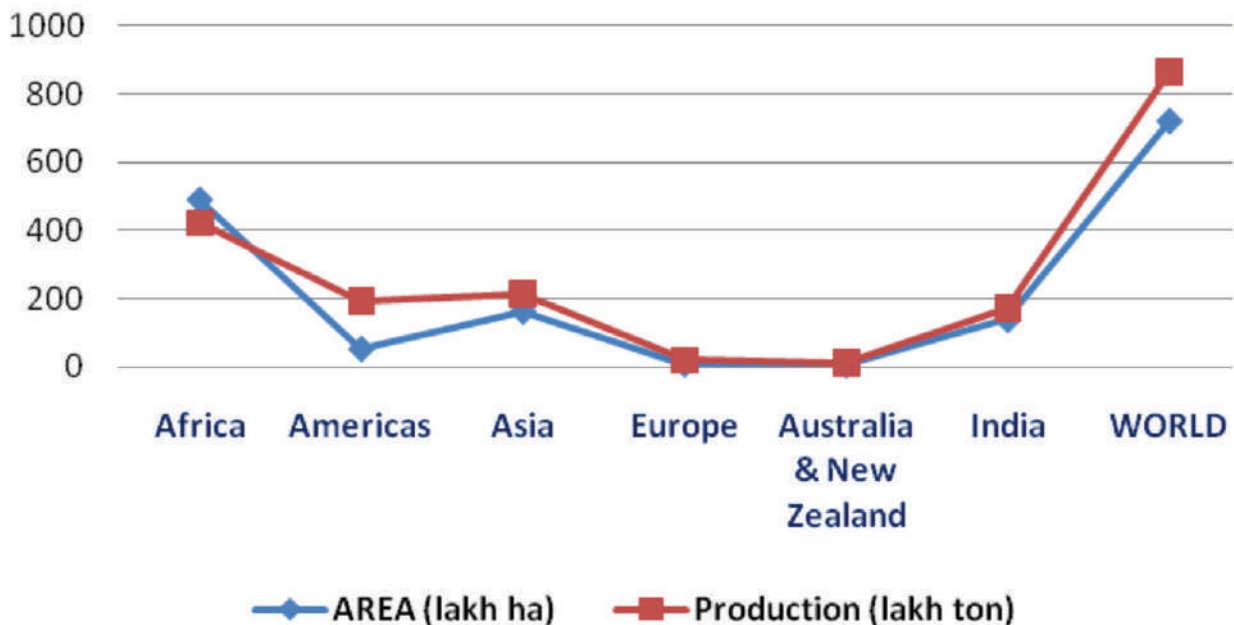


GLOBAL SCENARIO OF MILLETS

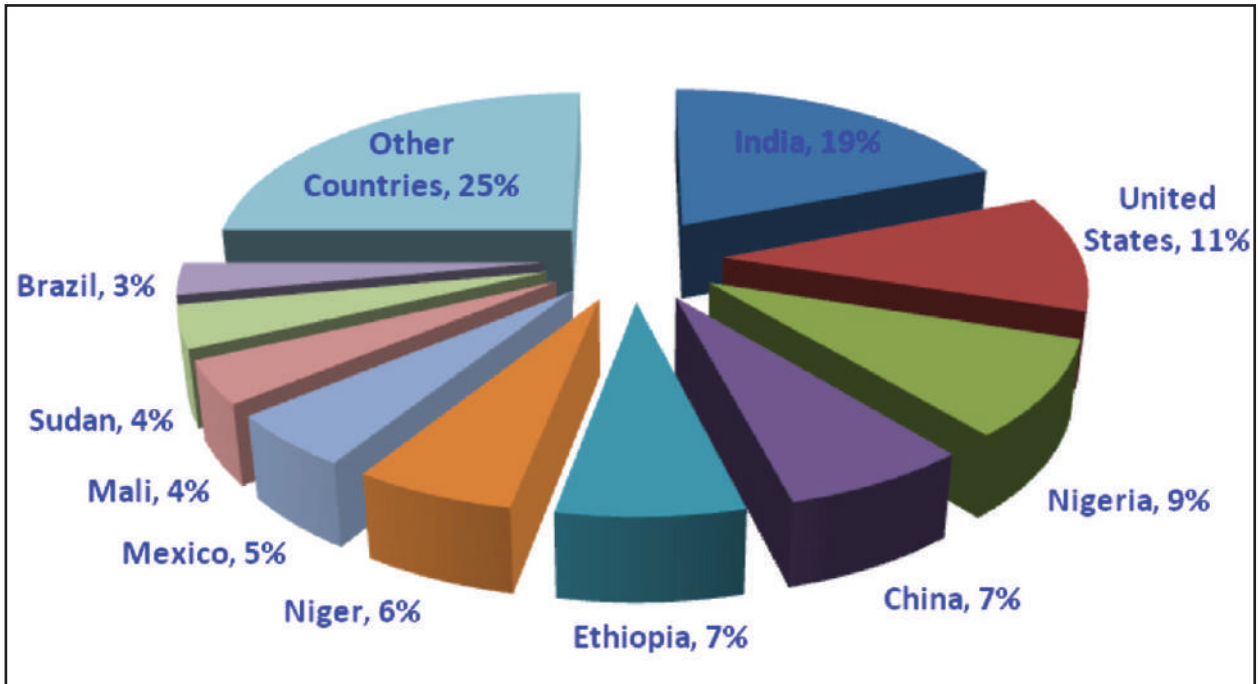
(Source: FAO Stat 2021)

Regions	AREA (lakh ha)	Production (lakh ton)
Africa	489	423
Americas	53	193
Asia	162	215
Europe	8	20
Australia & New Zealand	6	12
India	138	173
WORLD	718	863

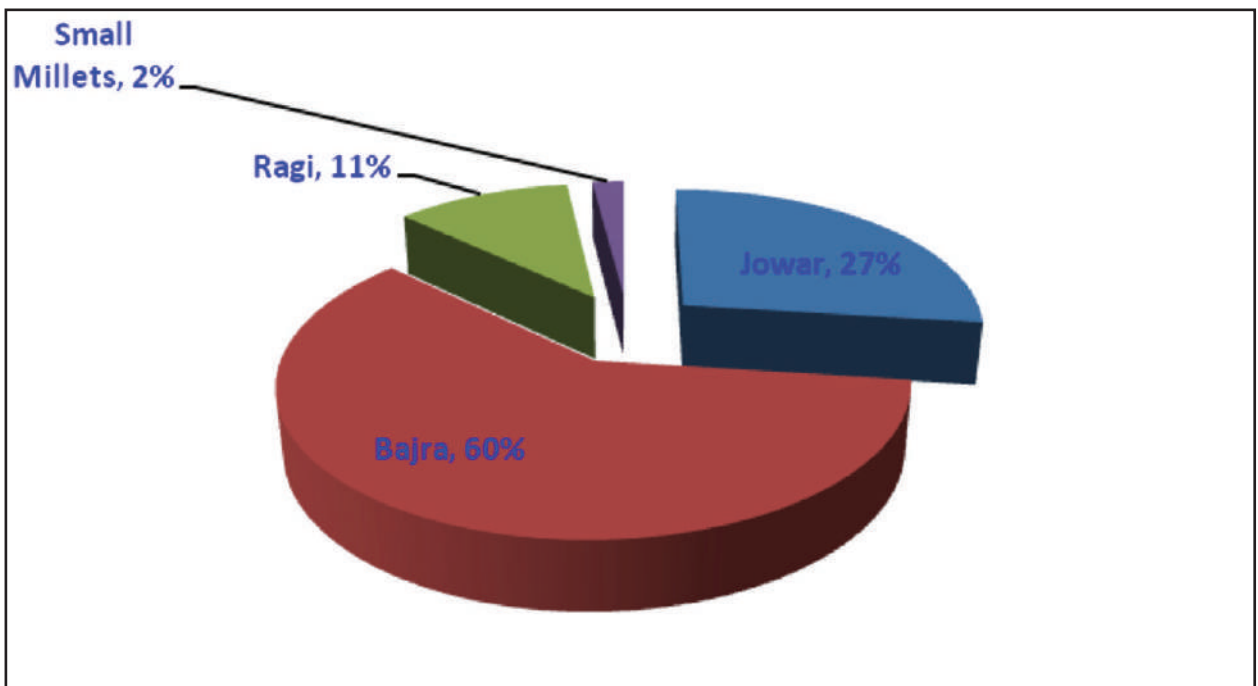
Global Scenario of Millets



Country wise Millets Production: 2020-21

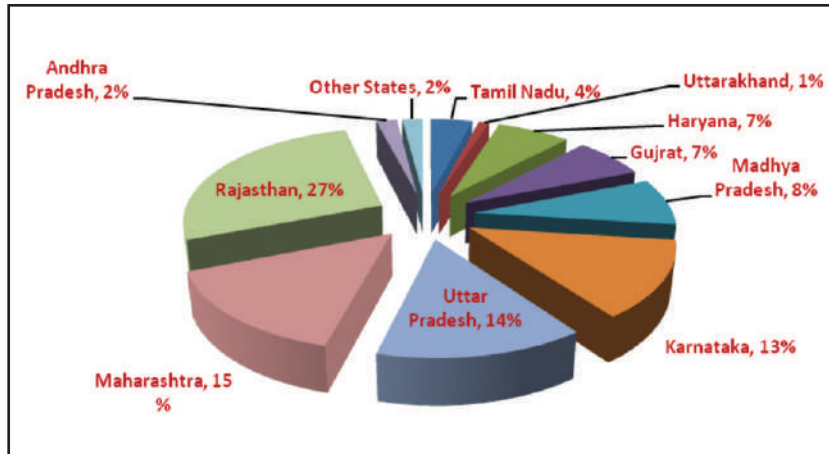


Production of Major Millets in India : 2021-22





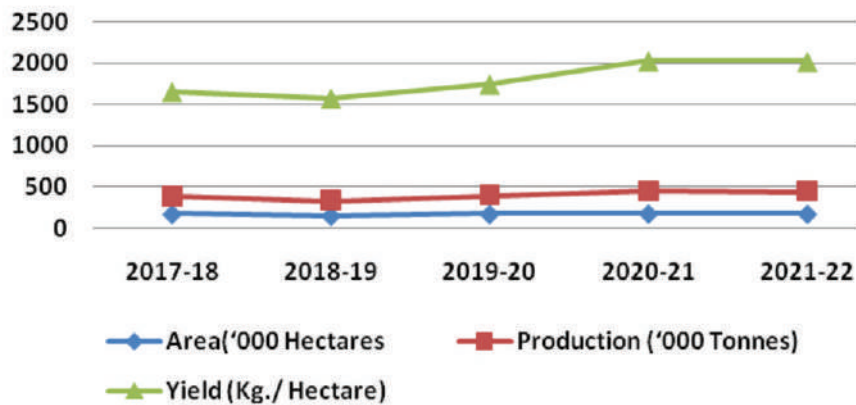
State wise Millet Production : 2021-22



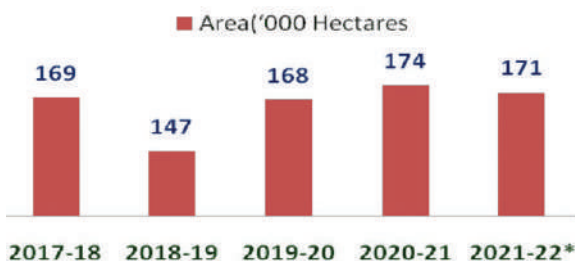
Area, Production and Yield of Millets in Uttar Pradesh in Last Five Years:

	2017-18	2018-19	2019-20	2020-21	2021-22
Area ('000 Hectares)	169	147	168	174	171
Production ('000 Tonnes)	214	183.31	226.63	274.57	269.84
Yield (Kg./ ha)	1270	1247	1349	1578	1578

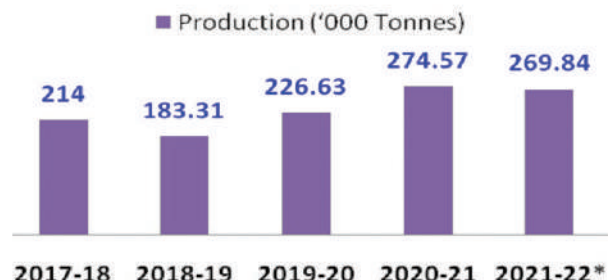
Millets in Uttar Pradesh in Last Five Years



Area('000 Hectares



Production ('000 Tonnes)





Year wise Area, Production and Productivity of Small Millets from 1950 to 2022

Year	Area	Production	Productivity
1950-1951	4605	1750	380
1951-1952	4764	1915	402
1952-1953	5044	1926	382
1953-1954	5677	2477	436
1954-1955	5630	2495	443
1955-1956	5335	2070	388
1956-1957	4976	1930	388
1957-1958	4870	1733	356
1958-1959	5159	2179	422
1959-1960	5148	2025	393
1960-1961	4955	1909	385
1961-1962	4868	2050	421
1962-1963	4772	1855	389
1963-1964	4621	2022	438
1964-1965	4558	1964	431
1965-1966	4564	1555	341
1966-1967	4584	1488	325
1967-1968	4857	1907	393
1968-1969	4746	1804	380
1969-1970	4733	1732	366
1967-1971	4783	1988	416
1971-1972	4477	1669	373
1972-1973	4265	1552	364
1973-1974	4567	1966	431
1974-1975	4466	1613	361
1975-1976	4672	1924	412
1976-1977	4680	1752	374
1977-1978	4574	2070	453
1978-1979	4397	1894	431
1979-1980	4002	1425	356
1980-1981	3976	1574	396
1981-1982	3787	1638	433
1982-1983	3500	1229	351
1983-1984	3638	1676	461
1984-1985	3214	1194	372
1985-1986	3155	1217	386
1986-1987	2975	1162	391
1987-1988	2901	1169	403
1988-1989	2743	1164	424
1989-1990	2703	1306	483
1990-1991	2447	1190	486
1991-1992	2088	882	423
1992-1993	1983	869	438
1993-1994	1888	917	486

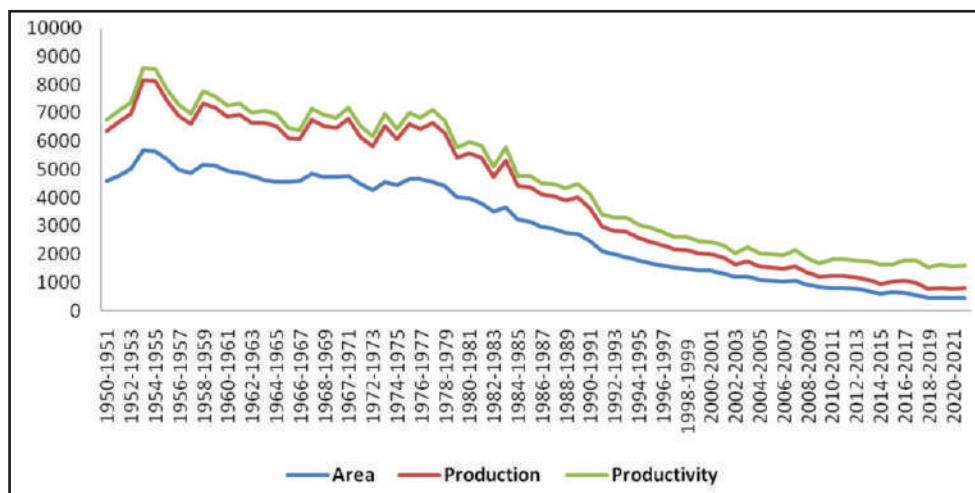




1994-1995	1792	798	445
1995-1996	1662	779	469
1996-1997	1601	728	455
1997-1998	1529	645	422
1998-1999	1495	671	449
1999-2000	1411	618	438
2000-2001	1424	587	412
2001-2002	1311	577	440
2002-2003	1201	459	383
2003-2004	1191	564	473
2004-2005	1101	478	434
2005-2006	1064	472	443
2006-2007	1010	480	475
2007-2008	1039	551	530
2008-2009	905	445	491
2009-2010	831	382	460
2010-2011	800	442	553
2011-2012	798	452	565
2012-2013	754	436	578
2013-2014	682	430	630
2014-2015	590	386	654
2015-2016	650	391	602
2016-2017	619	442	714
2017-2018	546	439	804
2018-2019	454	333	734
2019-2020	458	371	809
2020-2021	444	347	781
2021-2022	440	370	789
Total	212149	87899	33195

Source : Ministry of Agriculture & Farmers Welfare, GoI

Year wise Area, Production and Productivity of Small Millets

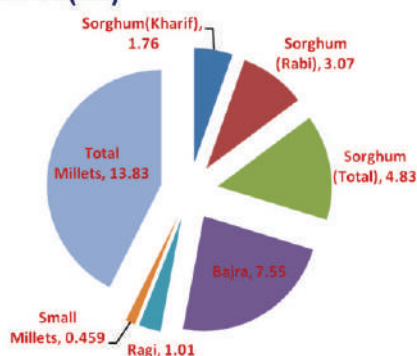




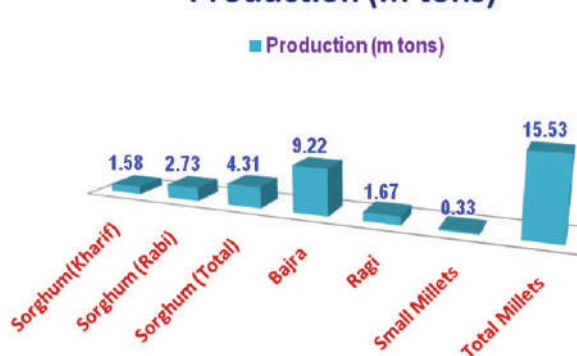
Area under cultivation, production, and yield of Millets

Crop	Area (m ha)	Production (m tons)	Yield (kg per ha)
Sorghum (Kharif)	1.76	1.58	967
Sorghum (Rabi)	3.07	2.73	1002
Sorghum (Total)	4.83	4.31	989
Bajra	7.55	9.22	1374
Ragi	1.01	1.67	1747
Small Millets	0.459	0.33	809
Total Millets	13.83	15.53	1248

Area(ha)



Production (m tons)



Production of Millets in District of Uttar Pradesh

S.No.	District	Sorghum (mt)	Pearl Millet (MT0)	Barnyard Millet (MT)	Kodo (MT)
1.	Mathura	16	93968	0	0
2.	Agra	99	293964	0	0
3.	Firozabad	118	179834	0	0
4.	Mainpuri	432	56580	0	0
5.	Fatehpur	14607	12901	0	0
6.	Pratapgarh	4102	14069	0	0
7.	Prayagraj	6885	33323	0	0
8.	Kaushambi	3372	12181	3	0
9.	Budaun	0	162658	0	0
10.	Barelily	142	12452	0	0
11.	Shahjahapur	1173	6050	0	0
12.	Lakhimpur Kheri	38	1199	0	0
13.	Sitapur	3997	1873	0	14
14.	HArdoi	6193	6907	36	0
15.	Unnao	1900	2272	0	0
16.	Lucknow	1318	1458	5	1
17.	Raebareli	3024	936	0	0
18.	Deoria	69	305	0	0





19.	Kushinagar	0	397	0	17
20.	Jalaun	7689	27727	0	5
21.	Jhasi	787	043	18	0
22.	Lalitpur	206	0	0	0
23.	Farrukhabad	6576	10518	0	0
24.	Etawah	224	89094	0	0
25.	Kanpur Dehat	14166	45197	5	0
26.	Kanpur Nagar	18761	2026	0	11
27.	Kannauj	671	2597	0	0
28.	Auraiya	1619	79216	0	0
29.	Ghazibad	0	798	0	0
30.	Bulandshar	8	24996	0	0
31.	Gautam Buddha Nagar	0	2401	0	0
32.	Baghpat	0	1212	0	0
33.	Muradabad	40	6027	0	0
34.	Rampur	286	7362	3	0
35.	Jyotibaphule	0	3484	0	0
36.	Sambal	174	100150	0	0
37.	Jaunpur	3484	11039	0	0
38.	Ghazaipur	3090	19525	0	0
39.	Varansi	4888	8111	0	0
40.	Chandauli	484	4394	0	0
41.	Mau	19	104	15	4
42.	Azamgarh	7	242	5	3
43.	Baliya	2523	993	8	0
44.	Mirzapur	5251	12654	0	0
45.	Sonbhadra	3098	262	3968	1645
46.	Sant Ravidas Nagar	1839	9108	0	0
47.	Hamirpur	14727	949	0	0
48.	Banda	41439	5989	11	4
49.	Mahoba	2114	52	7	4
50.	Chitrakoot	28103	19969	0	0
51.	Bahrahich	45	64	0	20
52.	Aligarh	1	196598	0	0
53.	Ettah	0	126569	0	0
54.	Hathras	9	102817	0	0
55.	Kasganj	61	121291	0	0
56.	Barabanki	1771	957	0	15
57.	Ayodya	2212	2	1	1
58.	Sultanpur	6667	463	3	0
59.	Ambedkar	829	19	0	0
60.	Amethi	5284	921	22	38
	Total	226633	1939267	4110	1821





Top 5 States of Millet Crops

Top 5 States	Millet Crops
Rajasthan	Bajra/Sorghum
Karnataka	Jowar/Ragi
Maharashtra	Ragi/Jowar
Uttar Pradesh	Bajra
Haryana	Bajra



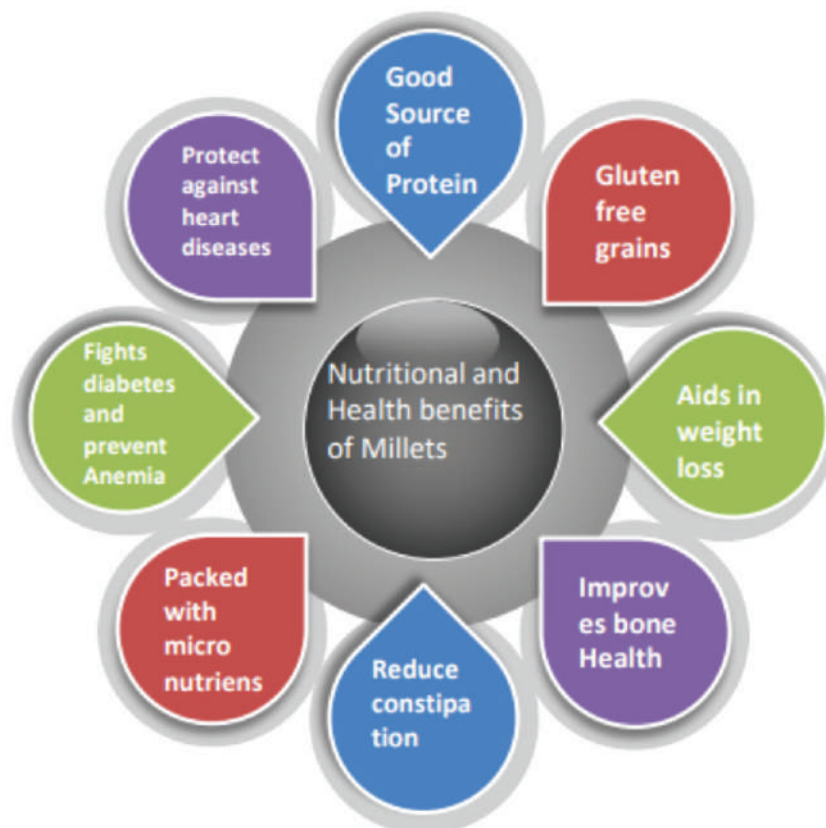


Nutritive value of Millets

Worldwide, millets are regarded as a significant grain, however, they are the least exploited. Millet grain is abundant in nutrients and health-beneficial phenolic compounds, making it suitable as food and feed. The diverse content of nutrients and phenolic compounds present in finger and pearl millet are good indicators that the variety of millet available is important when selecting it for use as food or feed. The phenolic properties found in millets comprise phenolic acids, flavonoids, and tannins, which are beneficial to human health. The proximate composition of millets in comparison with the commonly consumed cereals viz. rice, wheat and maize. The energy value of millets varies from approximately 307-347 Kcal. Millets contains about 60-68% carbohydrates 6-12% protein, 1.7-5.4% total fat and 1.3-3.27% total ash content. The total dietary fibre content of millet grains ranges from 6-12%. Millets are good source of micronutrients including minerals and B-vitamins as well as phytochemicals with health benefits.

Various Nutritional and Health benefits :

- Millets are more nutritious than wheat and rice in terms of proteins, mineral and Vitamins.
- Millets need very little water for production
- They can be grown in vast dry land areas using farmyard manures. Due to this, they reduce the dependence on synthetic fertilizers.
- Millet's cultivation is good for the environment, making it a sustainable crop to cultivate.





Pearl Millet (Bajra)



1. Pearl Millet (Bajra)

Botanical Name : *Pennisetum glaucum*
Family : Poaceae
Origin : West Africa

Pearl millet is the most widely cultivated cereal in India after rice and wheat. The domestication of pearl millet occurred in northern-central Sahelian Africa around 4500 BC. More than 90 million poor people depend on pearl millet for food and income. They generally live in the drier parts of Africa and Asia, places where most other crops just cannot grow, and local farm households literally have nowhere else to turn for food security. It is found to be beneficial in the process of weight loss due to its high fibre content and ability to prolong satiety. It has been found that due to its high fibre content it reduces the risk of occurrence of gall stone Pearl millet is a rich source of calcium and phosphorus which helps to attain peak bone density.

SOME IMPORTANT

- Grows in moist weather conditions as Kharif crops needing irrigation.
- Requires 40-50 cms of annual rainfall.
- Temperature requirements are from 20-30°C.
- Grows well in black cotton soil, sandy loamy soil, or upland gravelly soil having good drainage having a low pH value.
- Rajasthan is the largest producer of Bajra in India.

Pearl Millet Nutrient per 100 g	
Energy (Kcal)	361
Protein (g)	11.6
Carbohydrate (g)	65.5
Crude Fibre (mg)	1.2
Calcium (mg)	42
Iron (mg)	8.0

CROP INFORMATION

Improved Variety : Varsha, Bundela, CSV-13, CSV-15
 Seed Rate : 10-12 Kg/ ha
 Sowing time : June to 1st week of July
 Crop duration : 100-110 days
 Yield : 25-30 q/ ha





Sorghum Millet (Jowar)



2. Sorghum Millet (Jowar)

Botanical Name : *Sorghum bicolor*
Family : Poaceae
Origin : North-eastern Africa

Sorghum scientifically known as C4 plant, is one of the most energy efficient crops in use of solar energy and water to produce food and biomass Sorghum stover is a vital source of fodder for livestock. Over half a billion people rely on sorghum as a dietary mainstay and given its diversity of uses, as an important source of income. Sorghum and their products have high nutritional value and showed antioxidant, anti-obesity, anti-diabetic, anti-cardiovascular, anti-inflammatory, antimicrobial, and anticancer activities. However, sorghum have some limitations due to the presence of some anti-nutritional factors such as tannins, phytates, tryps in inhibitors, and protein cross linker. Technological processing such as soaking, germination, fermentation, thermal processes, irradiation, and others are suitable ways for removing or reducing anti-nutritional factors, improving sorghum quality, and producing foods with high nutritional value.

SOME IMPORTANT

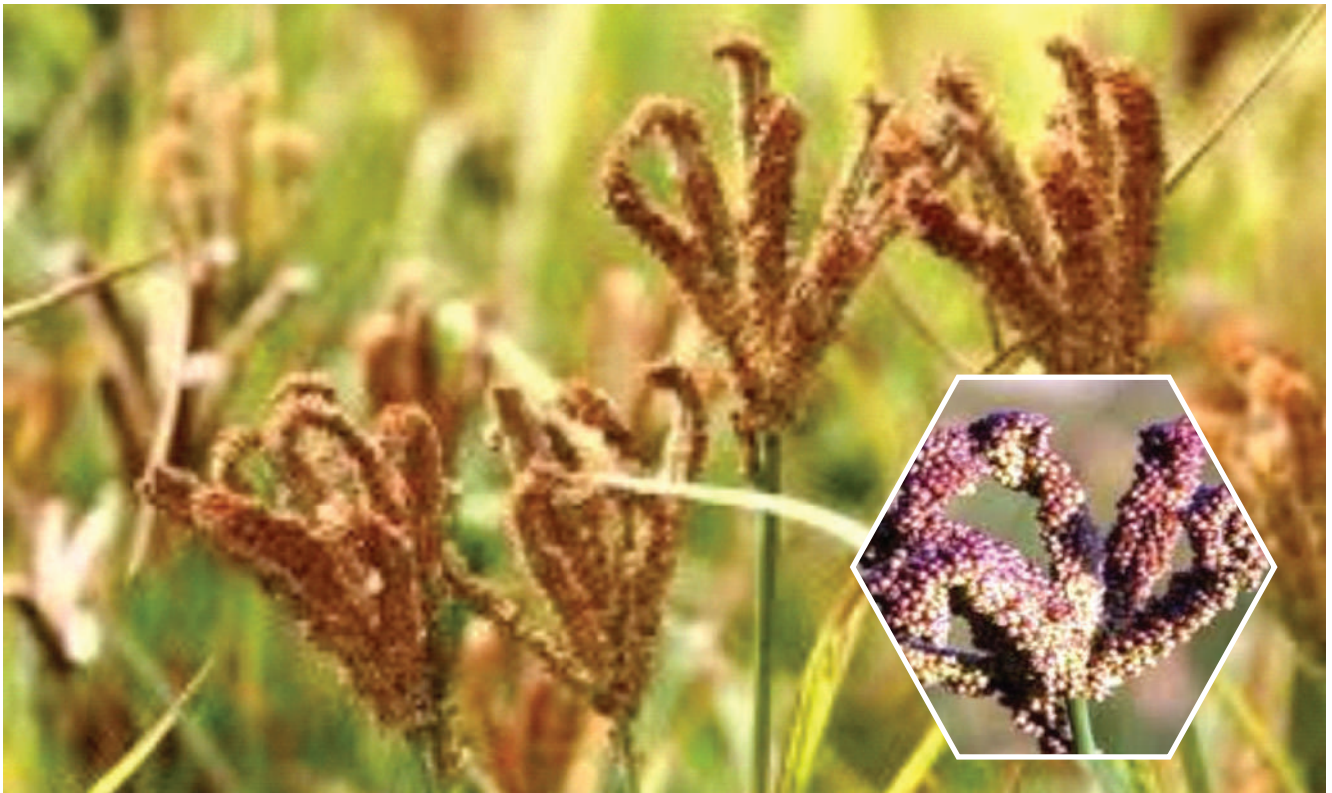
- Grows in warm, arid climates receiving around 45-100 cms of rainfall annually.
- Temperature requirements are around 20-35°C in Kharif season and around 15°C in Rabi season.
- Grows well in sandy loamy soils having good drainage and humus with a pH range from 6-7.5
- Maharashtra is the largest producer of Jowar in India.

Sorghum Nutrient per 100 g	
Energy (Kcal)	349
Protein (g)	10.4
Carbohydrate (g)	72.6
Crude Fibre (mg)	1.6
Calcium (mg)	25
Iron (mg)	4.1

CROP INFORMATION

Improved Variety : Varsha, Bundela, CSV-13, CSV-15
 Seed Rate : 10-12 Kg/ ha
 Sowing time : June to 1st week of July
 Crop duration : 100-110 days
 Yield : 25-30 q/ ha





Sorghum Millet (Jowar)



3. Finger Millet (Ragi)

- Botanical Name** : *Eleusine coracana*
Family : Poaceae
Origin : Western Tanzania or Ethiopian highlands

Finger Millet is an important primary food especially for the rural populations of Southern India and East & Central Africa. It is a domesticated cereal of African origin which spread in prehistory to Asia. In Asia upland races, which are especially widespread in the Himalayas from India to Nepal and southern China, appear to be a secondary adaptation. The grain is very nutritious and has excellent malting properties. Finger Millet plays an important role in both the dietary needs and incomes of many rural households in Eastern and Southern Africa and South Asia. It often known as ragi in India, stands unique among the cereals such as barley, rye and oats with higher nutritional contents and has outstanding properties as a subsistence food crop. It is rich in calcium, dietary fiber, phytates (0.48%), protein, minerals and phenolics. It is also a rich source of thiamine, riboflavin, iron, methionine, isoleucine, leucine, phenylalanine and other essential amino acids. The abundance of these phytochemicals enhances the nutraceutical potential of finger millet, making it a powerhouse of health benefiting nutrients.

SOME IMPORTANT

- Grows in high altitudes, with extreme climatic conditions.
- Requires dry spell at the time of grain ripening and receives around 70-120 cms of rainfall annually.
- Temperature requirements are around 25-30°C.
- Grows well in red, black, sandy, loamy, and lateritic soils with pH of about 4.5-8.
- Karnataka is the largest producer of Ragi in India.

Finger Millet Nutrient per 100 g	
Energy (Kcal)	328
Protein (g)	7.3
Carbohydrate (g)	72
Crude Fibre (mg)	2.6 g
Calcium (mg)	344
Iron (mg)	8.9

CROP INFORMATION

- Improved Variety : BL-101, PR-202, JNR-852, HR-374
 Seed Rate : 10-15 Kg /ha
 Sowing time : 25 June to 15 July
 Crop duration : 110-115 days
 Yield : 10-15 kg/ ha





Barnyard Millet (Sanwa)

4. Barnyard Millet (Sanwa)

Botanical Name : *Echinochloa colona*
Family : Poaceae
Origin : Central Asia

Barnyard Millet is cultivated on marginal lands where rice and other crops will not grow well. It is grown for both grain and fodder in India especially in the hilly tracts of Uttarakhand, Eastern Asia and parts of Africa, and in the Eastern USA, it has been a valuable forage crop. *Echinochloa crus-galli* was domesticated in Japan, China and Korea whereas *Echinochloa frumentacea* was domesticated in India. Barnyard millet is the fastest growing of all millets, with some varieties capable of producing a crop in just six weeks. It contains a rich source of protein, carbohydrates, fiber, and, most notably, micronutrients like iron (Fe) and zinc (Zn) that are related to numerous health benefits.

SOME IMPORTANT

- Grows in tropical and sub-tropical regions with an altitude up to 2100 m.
- Requires 60-80cms of rainfall annually.
- Temperature requirements are from 18-27 °C.
- Grows well in sandy loam to loamy soil having a sufficient amount of organic matter having pH from 5.5-7.5.
- The Himalayan hills are the largest producer of Barnyard millet in India.

Barnyard Millet Nutrient per 100 g	
Energy (Kcal)	341
Protein (g)	7.7
Carbohydrate (g)	67
Crude Fibre (mg)	7.6
Calcium (mg)	17
Iron (mg)	9.3

CROP INFORMATION

Improved Variety : T-25, IPM-19, 100 TNU-80 GEC429
 Seed Rate : 8-10 Kg/ ha
 Sowing time : June - July
 Crop duration : 90-95 days
 Yield : 10-12 qt



Kodo Millet



5. Kodo Millet

Botanical Name	: <i>Paspalum scrobiculatum</i>
Family	: Poaceae
Origin	: Tropical Africa

Kodo Millet is an annual tufted grass that grows up to 90 cm high. The grain is enclosed in hard, corneous, persistent husks that are difficult to remove. Kodo millet, also known as cow grass, rice grass, ditch millet, Native Paspalum, or Indian Crown Grass, it is estimated to have been domesticated in India 3000 years ago. *Paspalum scrobiculatum* var. *scrobiculatum* is grown in India as an important crop, while *Paspalum scrobiculatum* var. *commersonii* is the wild variety indigenous to Africa. Often it grows as a weed in rice fields. Kodo millet rich in dietary fiber and minerals; antioxidant potential is much higher than any other millet and major cereals which helps against oxidative stress and maintains glucose concentrations in type-2 diabetes. It also is useful in curing asthma, migraine, blood pressure, heart attack and atherosclerosis, diabetic heart disease and for postmenopausal in females.

SOME IMPORTANT

- Grows in a warm and dry climate and is extremely drought- tolerant.
- Requires 50-60cms of rainfall annually.
- Temperature requirements are from 26-29°C.
- Grows well in gravelly and stony soil such as in the hilly region having pH from 5.5-7.5
- Madhya Pradesh is the largest producer of Kodo millet in India.

Kodo Millet Nutrient per 100 g	
Energy (Kcal)	302
Protein (g)	8.03
Carbohydrate (g)	69.9
Crude Fibre (mg)	8.5
Calcium (mg)	22
Iron (mg)	9.9

CROP INFORMATION

Improved Variety	: T-25, T-46, Niwas-1
Seed Rate	: 10-15 Kg/ ha
Sowing time	: 25 June to 15 July
Crop duration	: 112-115 days
Yield	: 10-15 kg/ ha





Little Millet (Kutki)



6. Little Millet (Kutki)

- Botanical Name** : *Panicum sumatrense*
Family : Poaceae
Origin : Probable Indian origin

Little Millet is similar to proso millet in appearance but is generally shorter, has smaller panicles and seeds, and is grown on a limited scale voluntarily or with minimum care on poor lands. This millet was cultivated or naturalized throughout India and Sri Lanka, and cultivated in neighbouring countries and no diversity and related wild species are found outside India, suggestive of Indian origin. Little millet is a reliable fast-growing crop that is early maturing and resistant to adverse agro-climatic conditions. It contains slow carbohydrate, slow digestibility and low water-soluble gum content. The complex carbohydrates, phenolic compounds, antioxidant content present in them helps to prevent metabolic disorders like diabetes, cancer, obesity etc

SOME IMPORTANT

- Grows in tropical and sub-tropical regions with an altitude up to 2100 m.
- Requires 60-80 cms of rainfall annually.
- Temperature requirements are from 18-27°C.
- Grows well in sandy loam to loamy soil having a sufficient amount of organic matter having pH from 5.5-7.5.
- The Himalayan hills are the largest producer of Barnyard millet in India.

Barnyard Millet Nutrient per 100 g	
Energy (Kcal)	314
Protein (g)	10.13
Carbohydrate (g)	65.55
Crude Fibre (mg)	7.72
Calcium (mg)	32
Iron (mg)	1.3

CROP INFORMATION

- Improved Variety : JK-4, 8 OLM-203, BL-6, DHLM-36-3
 Seed Rate : 8-12 Kg/ ha
 Sowing time : Mid March to Mid May
 Crop duration : 45-60 days
 Yield : 700-1050 kg/ ha





Proso Millet (Chena)



7. Proso Millet (Chena)

Botanical Name : *Panicum milaceum*
Family : Poaceae
Origin : Central or eastern Asiatic

Proso Millet is a short-season crop cultivated in drier regions of Asia, Africa, Europe, Australia, and North America. The grain after hulling makes a nutritious and palatable cereal for unleavened bread or cooked. Proso millet or common millet is the true millet of the history and it is one of the oldest human foods and believed to be the first domesticated cereal grain. China and Eastern Asia. Yellow River valley of China has been suggested to be the origin. Proso millet is well adapted to many soil and climatic conditions. It is rich source of vitamins (niacin, B-complex vitamins, folic acid), minerals (P, Ca, Zn, Fe) and essential amino acids (methionine and cysteine), starch, and phenolic compounds like antioxidants and betaglucans. Seeds also contain components with healing benefits, which decrease the level of lowdensity lipoprotein cholesterol in blood and injury to the liver and high lecithin content which supports the neural health system.

SOME IMPORTANT

- Grown in warm, arid, non-irrigated regions of the world.
- It is drought-resistant and can tolerate scanty rainfall.
- Requires 20-50 cms of rainfall annually.
- Temperature requirements are from 10-45°C.
- It is well adapted to many soil types which have a pH of around 5.5-6.5.
- Madhya Pradesh is the largest producer of Proso millet in India.

Barnyard Millet Nutrient per 100 g	
Energy (Kcal)	309
Protein (g)	8.3
Carbohydrate (g)	65.9
Crude Fibre (mg)	9.0
Calcium (mg)	27
Iron (mg)	0.5

CROP INFORMATION

Improved Variety : CO-1, PB-146, PB-161, Nagarjun
 Seed Rate : 8-12 Kg /ha
 Sowing time : May - June
 Crop duration : 80-90 days
 Yield : 10-12 q/ ha





Foxtail Millet (Kangni)



8. Foxtail Millet (Kangni)

Botanical Name : *Setaria italica*
Family : Poaceae
Origin : China

Foxtail Millet grains are very similar to paddy rice in grain structure. They contain an outer husk, which needs to be removed in order to be used. Foxtail millet was domesticated in China more than 8000 years ago, contributing greatly to the development of Chinese civilization and remaining as a staple cereal in arid and semi-arid regions. Foxtail millet is fairly tolerant of drought; it can escape some droughts because of early maturity. Due to its quick growth, it can be grown as a short-term catch crop. It is adapted to a wide range of elevations, soils and temperatures it cannot tolerate water logging. It has unique protein composition containing a high content of essential amino acids. Anti-nutrients like phytic acid and tannin present in this millet can be reduced to undetectable amounts by using the proper processing methods.

SOME IMPORTANT

- Grows in warm, arid, semi-arid and tropical regions, and can survive poor water assets.
- Requires 50-75 cms of rainfall annually.
- Temperature requirements are from 15-30°C.
- Grows well in sandy to loamy soils with a pH of 5.5-7.
- Andhra Pradesh is the largest producer of Foxtail millet in India

Foxtail Millet Nutrient per 100 g	
Energy (Kcal)	341
Protein (g)	7.7
Carbohydrate (g)	67
Crude Fibre (mg)	7.6
Calcium (mg)	17
Iron (mg)	9.3

CROP INFORMATION

Improved Variety : SiA 3156, SiA 3088 (suryanandi), SiA 3085
 Seed Rate : 8-10 Kg/ ha
 Sowing time : July to August
 Crop duration : 80-90 days
 Yield : 20-25 q/ ha





Brown top Millet (Chhoti Kangni)



9. Brown top Millet (Chhoti Kangni)

Botanical Name : *Urochloa ramosa*
Family : Poaceae
Origin : Southeast India

Brown top millet a native of India, has relatively limited cultivation to the parts of Karnataka and Andhra Pradesh, though its occurrence as a weed is noted in all states of India. Browntop millet is drought hardy and heat tolerant, but can also be planted in low areas that get flooded. The shadow tolerant nature of this millet makes it distinct from other crops. Brown top millet or Korale millet is the rarest of all millet varieties and has great demands owing to its dense nutritional profile. Brown top millets are cultivated abundantly in dry regions of Karnataka, Andhra Pradesh, and parts of north-central India. They are drought and heat tolerant crops and their shadow tolerant nature makes them unique from other crops. Besides India, Brown top millet are widely cultivated in the United States, Asia, Africa, Australia, and China. The crop survives under arid conditions and has the potential to spread widely because of its rich nutritional value as well as its ability to adapt to climate change.

SOME IMPORTANT

- Browntop millet is remarkable for its early maturing ability. The crop is harvested in 90 days.
- Browntop millet is an annual warm-season species that grows 1 to 3 ft tall.
- The leaves are 2.2 to 18cm long and 6-18mm wide; both surfaces are smooth.
- It requires a little bit of moisture during sowing and one or two rains later, for the crop to grow and mature.

Brown top Millet Nutrient per 100 g	
Energy (Kcal)	340
Protein (g)	11.5
Carbohydrate (g)	71.32
Crude Fibre (g)	12.5
Calcium (mg)	10
Iron (mg)	650

CROP INFORMATION

Improved Variety : IC 617961
 Seed Rate : 8-10 Kg /ha
 Sowing time : Mid April to until Mid August
 Crop duration : 75-80 days
 Yield : 280-320 kg/ ha





SEVEN SUTRAS : THEMES GOVT. OF INDIA LEVEL LAUNCHES



SLOGAN on Millets

पोषक अनाज है गुणों का खजाना,
सस्ता-सुगम है इसे खेतों में उगाना ॥

स्वस्थ थाली मिलेट वाली





Enhancement of Production & Productivity of Millets

- Strengthening quality seed chain
 - Fully Support to Breeder Seed procurement
 - Support Foundation and Certified Seeds
 - Encourage PPP mode
 - Seed Hubs
- Frontline technology demonstrations/ cluster demonstrations.
- Demand creation through awareness and increase in consumption.
- Crop Diversification focus in favour of millets.
- States to take steps for procurement
- Generate awareness regarding Health and Nutrition benefits : Eat Right Campaign
- Steps 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.
- To commission studies by National/ International reputed organizations (TaskForce-II)
- Awareness among mothers through Mothers Committees of Anganwaadi
- **Value addition, Processing & Recipe Development**

Value Addition

- Strengthening of advanced infrastructure.
- Helping Start-ups with technical backstopping.

Processing

- Development of primary processing clusters at Farm Gate.
- MoFPI included Production Linked Incentive (PLI) scheme for millet products.
- Task force for bringing all processors, stakeholders under one umbrella (Corporate Led).

Recipe Development

- R&D on traditional/ contemporary millets recipes by IIMR, CFTRI & National Institute of Food Technology, Entrepreneurship and Management (NIFTEM) with higher shelf life with proper packaging & branding & ready to use products.
- Development of recipes, books & online modules through chef's & hotel management schools.
- Partnership of Hospitality Industry in popularizing recipes





Action Taken by the CSA University of Agriculture & Technology, Kanpur for celebrating International Millets 2023

- For popularization and identification of the Millets crops KVK demonstrate the millets through established cafeteria and also doing at least 1 acre area of Millet production on their KVK field.
- Organize events in various groups by NSS, NCC, schools and colleges
- Every KVK celebrated Millets Year 2023 by organizing Farmer-Scientist / Gosthi Programme.
- Training Programme to Anganwadis organized for promoting and awareness among the rural people.
- For promotion of Shree Anna(Millets) university has compulsory a dish based on Millets during trainings.
- Awareness programme organized at school level for adoption of Millet food in Mid Day Meal in schools as well as at college level.
- Availability of seed by distribution of millets among the farmers during Gosthis based on production technologies and value addition of Millets.
- Seminar organized at university level in which all KVK involve with their stall based on Millets recipes.
- KVK Home Scientist also trained Aanganwadi and farm women for setting up nutri-gardens of Millets
- KVK celebrated Poshan Maah in September month, during the whole month many awareness programme based on Millets were organized and is being organized
- Organized competition programme on “Shri Anna aadharit vyanjan Prtiyogita” by the KVKs. Farm women made many different dishes based on Millets and encourage them also.
- Directorate of Extension released a publication “Shree Anna (Millet) Visheshank, Krashak Bharti - 2023.
- University developed 16 varieties of 07 Millet crops.



