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Performance of Millets (Shree Anna) Production, Consumption, Trade and Government Interventions Initiatives in India

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Millets stand out for their exceptional nutritional profile, boasting high-quality fats, carbohydrates, proteins, dietary fiber, and mineral content in comparison to wheat and rice. Despite this, there has been a noticeable decline in millet consumption in rural areas of India, as opposed to urban regions, spanning from 1977-78 to 2011-12. The main objectives of this study are as follows: [a] To examine the global and Indian millet production growth. [b] To evaluate India's millet export performance. [c] To ascertain the relative significance of factors such as cultivation area and yield in millet production. [d] To assess the comparative advantage and competitiveness of Indian millet exports. The study relies on secondary data collected from FAO Stat and employs a variety of analytical methods, including compound growth trend analysis, decomposition analysis, Revealed Comparative Advantage (RCA), Revealed Symmetric Comparative Advantages (RSCA), Revealed Competitive Advantage (RC) index, and Trade Specification Coefficient Index (TSC Index). The findings of this study reveal that on a global scale, millet production and yield have steadily increased from 1961 to 2021, despite a reduction in the total millet cultivation area. Yield emerges as a significant driver behind the global surge in millet production. In India, the acreage and production of millets witnessed a decline from 1966-67 to 2019-20, while yields saw an uptick, attributed to the adoption of high-yielding seed varieties. Decomposition analysis unveils that yield had a negative impact on the overall production growth of finger millet, minor millets, and sorghum, but a positive influence on pearl millet. India's millet exports soared to 27.42 million US dollars in 2021, exhibiting an impressive compound growth rate of 15.67 percent per annum from 1981 to 2021. Key indices, such as Revealed Comparative Advantage, Revealed Symmetric Comparative Advantages, Revealed Competitive Advantage, and Trade Specification Coefficient Index, underscore India's comparative advantage and competitiveness in the global millet export market. In a concerted effort to stimulate millet production and consumption in India, both the Central Government and State Governments have implemented various interventions. It is anticipated that these initiatives will lead to increased millet production and consumption within the country, thereby contributing significantly to nutritional security and sustainability.

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Odisha Millets Mission – An Evaluation from Tribal Development Perspective

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The objective of this study is to assess the extent of the benefits received by tribal populations and farmers due to OMM's initiatives during this period 2017-24 and to identify further efforts required to achieve developmental goals. Up to the year 2023-24, OMM has covered 46.19 per cent of the total Scheduled Tribe (S.T.) farmers. Ragi (finger millet) is a staple food in tribal households, preferred over other millet crops like jowar, bajra, and small millets. However in 2019-20, ragi occupied just 1.62 per cent of the total cropped area, which is relatively low. Encouraging farmers, particularly in tribal regions, to grow more ragi can greatly increase their income, thanks to the resilience and drought tolerance of millet crops. Most tribal districts in the state face water scarcity, making millet crops a more viable option due to their lower input requirements compared to paddy. Smallholder tribal farmers, often lacking capital, can afford to cultivate millets. The adoption of agronomic practices like System of Millet Intensification (SMI) and Line Transplanting/Seed Rate Management (LT/LS) has led to an increase in millet yield from 6.4 quintals/ha in 2016-17 to 14.9 quintals/ha in 2019-20. A strategic approach is needed to achieve ragi yields comparable to OMM's yields beyond 2026-27, especially in the twelve tribal districts. While around 76.4 per cent of ragi growers use their own farm-saved seeds, there is a need for community seed centers to provide an adequate quantity of ragi and other millet seeds on time to reduce dependency on farm-saved seeds. Presently, only 20-30 per cent of millet produced in Odisha is procured under the Minimum Support Price (MSP) scheme, with the rest being sold in the open market. To prevent distress sales by ragi growers, especially tribal farmers, market interventions through price support schemes are required. In an effort to address the nutritional deficiencies and promote consumption, the government supplies one kilogram of subsidised ragi at Re. 1.00/kg per ration card holder through the Public Distribution System (PDS) in seven districts of the state. Extending this distribution to all twelve tribal districts is essential to tackle the problem effectively. Approximately 57 per cent of under-five tribal children in the state suffer from chronic malnutrition. The distribution of Ragi Laddu as a morning snack to preschool children under the Integrated Child Development Services (ICDS) in Anganwadi centers is a positive step, and it is crucial to expand this initiative to include all tribal districts. The per capita annual income of Scheduled Tribe (S.T.) agricultural households is significantly lower compared to the state average. To uplift the income levels and reduce poverty among S.T. agricultural households, OMM should adopt a suitable strategy to increase millet (ragi) crop cultivation, production,

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and productivity by disseminating improved agronomic practices across all tribal districts. Additionally, encouraging women from non-agricultural tribal households to participate in Women Self-Help Groups (WSHGs) and Farmer Producer Organizations (FPOs) can empower them and contribute to higher family income. In conclusion, there is a need to reorient OMM's approach to fulfill its objectives comprehensively, as the current delivery of benefits in tribal areas falls short of desired levels.

Comparative Performance of Millets in Odisha, Madhya Pradesh and India

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The study aimed to investigate the trends in millet cultivation, including area, production, and yield, in the states of Odisha, Madhya Pradesh, and at the national level in India. Secondary data, sourced from the website indiastat.com, were utilised for the analysis, covering the period from 2000-01 to 2020-21. Analytical tools such as the compound growth rate and coefficient of variation were employed to assess the data. The study's findings indicated a positive overall increase in millet production over time, but a simultaneous decline in the cultivation area dedicated to millets. Notable regional variations were observed, with Madhya Pradesh experiencing growth in both bajra cultivation in area and production, while Odisha witnessed a decline in these aspects. Both states saw reductions in the area and production of jowar, although the yield increased. In Odisha, the highest variability was observed in the yield of ragi, while in Madhya Pradesh, the greatest variability was noted in the area and production of ragi. The most significant growth rate was found in the yield of bajra in Odisha, while in Madhya Pradesh, the highest growth rate was associated with small millets' yield. The study underscores the importance of expanding millet consumption to cater to individuals seeking gluten-free and fiber-rich dietary options, as well as those interested in organic products for their health benefits. Furthermore, it recommends that state governments promote organic farming in millets due to their natural resistance to a wide range of pests and diseases.

Assessing the Impact of Integrated Farming Systems on Agricultural Productivity and Livelihood of Farmers in Puri District, Odisha

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A research study was conducted in Odisha's Puri District, specifically in the Nimapara, Kanas, Delanga, and Pipili blocks, to assess the impact of Integrated

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Farming Systems (IFS) on agricultural productivity and livelihoods. Specifically, the study aimed at identifying the predominant IFS practices, evaluating their effectiveness, and examining the challenges and opportunities faced by IFS farmers in the Puri district of Odisha. Data collection involved structured interviews with 110 randomly selected farmers using a well-designed and pretested interview schedule. Preliminary findings from the study reveal a significant presence of integrated farming practices in the study area. The predominant IFS systems observed include combinations such as crop + livestock, crop + poultry, crop + livestock + poultry, crop + livestock + resource generating, crop + livestock + fishery, and even more complex systems like Crop + Livestock + Fishery + Mushroom + Resource Generating. To assess the economic viability, the study compared income generation and return on investment between IFS and conventional farming systems. Notably, FS-III demonstrated significantly higher profitability, with a Benefit-Cost Ratio (BCR) of 2.86 and a relative economic efficiency of 123 percent. Farming System-IV (Crop-Livestock-Poultry) on one acre of land also proved significantly more profitable, with a Marginal Benefit-Cost Ratio (MBCR) of 7.98 compared to non-IFS farmers. The study also identified and ranked the challenges and constraints faced by farmers in adopting and implementing IFS. The top three challenges were identified as "Scarcity and high cost of labour," "Management of subsidiary enterprises like dairy, sheep, and goat units," and "High cost of inputs for different farm enterprises," ranking I, II, and III, respectively. Ultimately, this research aims to enhance agricultural productivity, improve livelihoods, and promote sustainable rural development in Puri district, Odisha. The findings will contribute to the development of policy and institutional support mechanisms needed to encourage and scale up the adoption of IFS practices.

An Analysis of Growth and Instability in Area, Production and Productivity of Finger Millets in Odisha

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In the context of 2018 being declared as the National Year of Millets and 2023 as the International Year of Millets, there has been a concerted effort to promote millets with a focus on nutritional enrichment, environmentally friendly cropping patterns, and ensuring remunerative returns. Among the various millets, finger millet (ragi) stands out as one of the top three important crops in the country and holds a particularly significant position in Odisha. This study utilizes time series data on the area, production, and productivity of finger millet over two distinct periods: Period I

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(1981-82 to 2000-01) and Period II (2001-02 to 2020-21). The findings shed light on the evolving trends in finger millet cultivation in Odisha. Over the years, it is evident that finger millet's area, production, and productivity have exhibited a notable degree of variation in Odisha. Through an analysis of Compound Annual Growth Rates (CAGR) spanning the past four decades, it becomes evident that while the productivity of finger millet has increased, the cultivation area and overall production have declined, both within the State and across the country. Among the districts in Odisha, Koraput and Ganjam emerge as major contributors in terms of both the cultivation area and production of finger millet. To improve the finger millet scenario in Odisha, several measures can be considered. These include the introduction of improved millet varieties, providing adequate financial support to farmers through initiatives like the Odisha Millet Mission, and raising awareness among consumers about the nutritional significance of millets. These efforts have the potential to significantly enhance the prospects of finger millet cultivation in Odisha.

Economic Feasibility of Millets Residue Conversion

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Millets are considered minor cereal crops characterized by small, spherical whole grains that have been cultivated extensively in various Asian and African nations. In India, their cultivation has deep historical roots, serving diverse purposes such as human consumption, animal feed, and bird feed. However, with the advent of the green revolution and the ever-growing demands of a rapidly increasing population, farming practices in India shifted significantly from subsistence farming to commercial farming, primarily focusing on high-yielding variety (HYV) seeds of crops like paddy and wheat. This shift resulted in a gradual neglect of minor cereal crops, including millets. In recent decades, there has been a resurgence of interest in millets, driven by their recognized nutritional value, resilience to climate variations, and adaptability to diverse agroecological zones. Nevertheless, the processing of millets generates substantial waste, which is often underutilized or discarded, contributing to environmental pollution and economic losses. However, there is a promising path forward to harness these millet-based byproducts as sustainable sources of energy. The first step in this utilization process involves the densification of biomass. Densification can take the form of bales, briquettes, or pellets, effectively increasing the energy content of the material. This not only facilitates more efficient

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transportation and storage but also reduces handling costs. Ultimately, it promotes the wider adoption of renewable energy sources while minimizing environmental impact. Briquettes, for instance, can be created by compressing biomass or straw bales under high pressure, without the need for binders. These dense blocks become an efficient and cleaner fuel source suitable for combustion in stoves or boilers. Another sustainable product that can be derived from agricultural residues, including millet residues, is biofuel. Biofuel production involves biomass conversion, where organic materials, such as crops or waste, are transformed into fuel through processes like fermentation (for ethanol) or extraction and refining (for biodiesel). This approach provides a renewable and environmentally friendly alternative to fossil fuels. Additionally, biochar can be produced from millet residues using pyrolysis, a process in which the residues are heated in a low-oxygen environment, converting them into a stable, carbon-rich material. Biochar not only improves soil quality but also helps sequester carbon, contributing to environmental sustainability. A multidisciplinary approach, combining scientific analysis, technical evaluation, and economic feasibility studies, has the potential to maximize the utilisation of millet waste, foster the production of greener and alternative fuel sources, and create additional income opportunities for farmers. This holistic approach also contributes to rural development while promoting sustainable solutions for millet waste management.

Growth and Instability in Area, Production, Productivity of Millets in India

Vinod Kumar[*]

Millets have traditionally played a pivotal role as the primary source of income, dietary energy (serving as staples), and protein for populations residing in arid and semi-arid tropics worldwide. These grains are renowned for their nutritional richness, low water and input requirements, and resilience to varying climatic conditions. India holds the distinction of being the world's largest producer of millets, contributing 43.90 percent of the global production in 2021. Other significant millet-producing countries include China (8.97 percent), Niger (7.13 percent), Nigeria (6.39 percent), Sudan (4.99 percent), and Mali (4.94 percent). Together, these six nations account for a substantial 76.33 percent of the world's millet production. The trends in millet cultivation in India over the years reveal that the area and production of millets experienced compound annual growth rates (CAGR) of (-) 1.87 per cent and (-) 0.13 percent, respectively, from 1960-61 to 2021-22. The study also highlights the instability in millet cultivation, calculated using coefficients of variation. There has been significant variability in both the area (31.48 percent) and production (13.54 percent) of millets during this period. The millet cultivation area in India has decreased from 37.36 million hectares in 1960-61 to 10.92 million hectares in 2021-

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22. Meanwhile, production increased from 16.84 million tonnes in 1960-61 to 25.09 million tonnes in 1991-92 but subsequently declined to 16.00 million tonnes in 2021-22. The yields of various millets, including jowar, bajra, ragi, and small millets, have witnessed a positive trend, increasing from 533 kg/ha, 286 kg/ha, 731 kg/ha, and 385 kg/ha in 1960-61 to 1110 kg/ha, 1436 kg/ha, 1401 kg/ha, and 885 kg/ha in 2021-22, respectively. Among these, bajra accounted for the highest share in India's total millet production followed by jowar, ragi, and small millets. The major millet-producing states in India include Rajasthan, Karnataka, Maharashtra, Uttar Pradesh, Haryana, Gujarat, Madhya Pradesh, Tamil Nadu, Andhra Pradesh, Uttarakhand, and Odisha. These 11 states collectively contributed to around 98 percent of millet production in India during 2021-22, with Rajasthan alone accounting for 26.72 percent of the total millet production. India's total millet exports reached Rs. 608.11 crore in 2022-23, with the UAE, Saudi Arabia, Nepal, Bangladesh, Japan, and the USA being the largest markets for Indian millet products. These top six countries constituted 52.23 percent of total millet exports in 2022-23. Furthermore, the announcement of 2023 as the International Year of Millets (IYM) has spurred efforts to increase production and demand for millets, owing to their nutritional and health benefits and suitability for cultivation in adverse and changing climatic conditions. India has been actively leading initiatives around IYM 2023, positioning itself as a global hub for millets. The Union Budget for FY2024 has recognized millets as 'Shree Anna' or superfood, emphasizing their significance. To address challenges on both the supply and demand sides, a two-pronged strategy has been adopted: (a) increasing millet production through genetic improvement, strengthening the seed chain, implementing enhanced agronomic practices, and extending shelf-life through value addition, and (b) stimulating demand by incorporating millets into the Public Distribution System and other welfare schemes, promoting industrial usage of millets, and capitalising on export market opportunities. Urgently, there is a need to fortify the seed chain by establishing an adequate number of seed hubs, especially for minor millets, to boost the adoption of new cultivars and enhance the seed replacement rate.

Food and Nutritional Security Among Tribal Communities of Odisha

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Food and nutritional security pose significant challenges for tribal communities in Odisha, India. This abstract delves into the obstacles and factors that impact food and nutritional security within these communities. Several factors converge to affect food availability for tribal communities in Odisha. They primarily rely on subsistence agriculture, often with limited access to essential agricultural resources. Additionally, their dependence on forest resources plays a role in shaping food availability.

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Economic constraints compound the issue of food and nutritional security among tribal communities. Poverty, marginalization, and limited economic opportunities make it difficult for them to afford a diverse and nutritious diet. Furthermore, health and sanitation issues add complexity to the challenge of food security. These issues can further exacerbate the vulnerability of tribal communities. Education and awareness initiatives focused on nutrition, hygiene, and food preparation practices hold the key to improving food security among these communities. Addressing food and nutritional security among tribal communities requires a multifaceted approach. This includes enhancing agricultural practices while simultaneously promoting social inclusion, education, and health improvements. Effective coordination among government agencies, non-government organizations, and other stakeholders is pivotal for the success of interventions aimed at enhancing food and nutritional security within tribal communities.