

## 9. Millets in Crop Diversification

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### **Abstract:**

*Global food production ought to increase in order to feed a population that will top 8.5 billion by 2030 and 9.7 billion by 2050. With the climate issue getting worse and environmental stressors getting worse, there is a greater need for agricultural diversity through supporting crops that can be grown in the harshest of situations. In addition, sedentary lifestyles today and an overdependence on cereals after the green revolution have led to an increase in health-related diseases.*

*Only by integrating millets, which are rich in nutrients, in our daily meals will we be able to counteract this. The production of the main basic grains has decreased as a outcome of the current worldwide phenomena known as climate change. Millets are C4 plants that have very superior photosynthetic efficiency, a short lifespan, a higher dry matter production capacity, and a high level of heat and drought tolerance.*

*These characteristics have paved the way for their beginning into agricultural production systems to create cropping systems that are climate resilient. This chapter mainly focused on crop diversification, millets and their characters, millets in crop diversification and constrains.*

*Growing "climate-resilient millets" might be a pleasant answer since they are able to handle agricultural, climatic, and nutritional obstacles in addition to lowering under nutrition among communities to boost food security.*

### **Keywords:**

*Millets, Crop diversification, Sustainability, Climate resilience and Food security.*

## 9.1 What Are Millets?



**Figure 9.1: Millets**

The word millet is derived from the French word “mille” which means that a handful of millet contains thousands of seed grains (Taylor and Emmambux, 2008). They are a member of the Poaceae family. Millets are a category of small-seeded annual grasses that are produced as grain crops, particularly on marginal land in dry zones of temperate, subtropical, and tropical countries. They can be by and large separated into two groups A. major millets and B. minor or small millets. The major millets include sorghum and pearl millet. Whereas, finger millet, foxtail millet, little millet, kodo millet, barnyard millet, proso millet and brown top millet are categorized under minor millets. The abundance of dietary fibres, antioxidants, minerals, phytochemicals, polyphenols, and proteins in millets makes them special in the battle against diseases.

## 9.2 What’s The Peculiarity of Millets?

According to the ancient author Strabo, "millet" is the best famine preventative since it can resist any unfavourable weather and never falters, despite the scarcity of every other grain. Throughout the beginning of time, Asia, Africa, and Europe have all enjoyed brewing and eating millets as a staple cereal. These could have been among the first crops to be farmed during the "Hoe Age," the period before the "Plow Age." Due to its drought-resistant growth characteristics, millet proven to be a highly significant staple grain in African and Asian societies before effective irrigation systems were developed. It remained significant until the art of cultivating wheat and rice was fully developed. According to estimates, millets are an important part of the diets of more than 90 million people in Asia and Africa. Africa is responsible for more than 55% of the world's output, followed by Asia with about 40%, and Europe with only 3% of the total market. India still leads the world in millet production after years of neglect. While it produces less than water-hungry cereals like rice and wheat, it is more nutritious.

Millets, which have long been a staple crop for millions of farmers, are thought to be among the oldest domesticated plants. These millets develop more quickly and finish their life cycle in 2-4 months. They also fit into a variety of cropping systems and are able to adapt to shifting environmental circumstances, particularly during monsoon season.

One of the first grains that can be grown in rain-fed locations with low soil fertility and moisture levels is millets. It can withstand problems like climate change, drought, low moisture, poverty, and hunger since it is a water-wise crop.

The root system's effectiveness allows it to handle 28% of the rainfall required for paddy. In other words, on the equivalent plot of land, millet may be grown for 30 years straight using the same sum of water required for an acre of summer rice. Little millets are produced in a range of agro-ecological settings, including plains, the coast, and hills, as well as in soils with variable properties, get altering amounts of rainfall, and experience significantly different temperature and photoperiods.

They are well-known for their hardiness, ability to withstand drought, and relative resistance to serious pests and diseases. In tribal and hill agriculture, where crop replacement is challenging, they are essential. These plants, which are C<sub>4</sub>'s, are added eco-friendly due to their high water usage efficiency and low input needs, however they are still responsive to high input management.

"Millets can help contribute to some of the most difficult areas where it will take longer to achieve the sustainable development goals, such as the needs for nutrition and health, the mitigation and adaptation to climate change, and the poverty of smallholder and marginalised farmers in the dry zones." According to research, "the high carbon concentration of crop leftovers makes them particularly essential for maintaining and increasing soil carbon levels, vital for sustainable cropping systems, and, when applicable, significant for simultaneously supplying fodder for animals."

### **9.3 How Millets Help in Food Security?**

Global food security has been viewed as potentially being challenged by the shrinking diversity of crop species that contribute to the world's food sources. Just 12 crops account for 75% of the world's food production, while the three primary crops of rice, wheat, and maize provide for 50% of nutritional needs on a worldwide scale. While these crops are the main sources of carbohydrates, they are deficient in crucial minerals and amino acids for a balanced diet. Millions of individuals throughout the world suffer from hidden hunger as a result of inadequate intake of vitamins and micronutrients including zinc (Zn), magnesium (Mg), and iron (Fe).

This nutritional deficiency in human diet affects millions of people globally. For instance, budding nations are home to about half of the world's micronutrient malnourished people. This is mostly due to an over reliance on starchy foods like rice, wheat, and maize. This is an example of how supplementing main cereals with millets that have superior nutritional content and nutraceutical characteristics might be a successful method for increasing dietary variety and decreasing secret hunger. Table 9.1 lists specific properties of several millets.

**Table 9.1: Different Millets and Their Special Characteristics**

<b>Millet</b>	<b>Common name</b>	<b>Botanical name</b>	<b>Special characteristics</b>
<b>Sorghum</b>	Great millet, Jowar, Kafir corn, Guinea corn, Kaolin in China, and Milo in Spain	<i>Sorghum bicolor</i>	Tolerate moisture stress and high temperature better than any other crop
<b>Pearl millet</b>	Bajra, Cattail millet, Black millet, German millet	<i>Pennisetum glaucum</i>	Grow in arid and semi-arid region, richest source of folic acid
<b>Finger millet</b>	Ragi, Wimbi, Mandua, Nachni, Kapai, Nagli, Marua	<i>Eleusine coracana</i>	Wider adaptability, rich source of calcium
<b>Proso millet</b>	Cheena, Common millet, Broom millet	<i>Panicum miliaceum</i>	Short duration, tolerant to heat and drought
<b>Foxtail millet</b>	Indian paspalum, Kangni, Water couch, Italian millet	<i>Setaria italica</i>	Short duration, tolerant to low soil fertility and drought
<b>Kodo millet</b>	Kodo, Ditch millet, Creeping paspalum	<i>Paspalum scrobiculatum</i>	Long duration, grown well in shallow and deep soil, rich in folic acid
<b>Barnyard millet</b>	Sawan, Jhingora, Kudraivali, Oodalu	<i>Echinochloa frumentacea</i>	Fastest growing, voluminous fodder
<b>Little millet</b>	Kutki, Samai, Samalu, Hog millet	<i>Panicum sumatrense</i>	Short duration, withstand both drought and waterlogging
<b>Browntop millet</b>	Korale in Kannada	<i>Brachiaria ramosa</i>	Rapidly maturing, best suited for catch crop
<b>Teff</b>	Teff, lovegrass, annual bunch grass, Williams love grass	<i>Eragrostis tef</i>	Massive fibrous rooting system, drought tolerant, ephemeral nature
<b>Fonio</b>	Fonio, Acha, Hungry rice	<i>Digitaria exilis</i> (White fonio) <i>Digitaria iburua</i> (White fonio)	Smallest seeds among millets, fast growing and highly nutritious

Millet	Common name	Botanical name	Special characteristics
<b>Job's tears</b>	Adlag, Adlay millet	<i>Adlag, Adlay millet</i>	Grown in higher areas, used in folk medicine
<b>Guinea millet</b>	False signal grass, Babala, Bajra/Bajira	<i>Urochloa deflexa</i>	Potential as grain crop

**Source:** Kumar *et al.*, 2021

Millets are highly nutritious and also rich in protein, dietary fiber, vitamins, and minerals. Due to their great nutritional content, they are frequently referred to as "Nutri-Cereals." Along with those, they have immense health benefits. These medicinal importances of different millets are given in Table 2. Millets have lately gained weight due to their high nutritional content, proven health advantages, adaptability to a variety of environmental conditions, sustainability in low input agriculture, and suitability for organic growing. As millets are the only crops that guarantee yields in famine circumstances, they are occasionally referred to as "famine crops." Being the last alternative for cultivation, these crops were formerly referred to as orphan crops. Nonetheless, these underutilised crops are crucial for the livelihood, food, and nutritional security of the underprivileged across the world, as well as for diversifying our food supply.

**Table 9.2: Medicinal Value of Different Millets**

Millet	Medicinal importance
<b>Pearl millet</b>	Turns the gut condition to alkaline and cures stomach ulcers, high amounts of magnesium and potassium control blood pressure and relieve heart diseases, magnesium also reduces respiratory problems and migraine attack, high phosphorous content helps in bone growth and development in kids, high amount of dietary fiber and slow release of glucose maintains blood sugar level and more suitable for diabetic patients, phytic acids reduce the cholesterol levels of body, hypoallergic properties make it a suitable diet for lactating mothers, infants, elderly people, and convalescents.
<b>Finger millet</b>	High amounts of phenolic acids have anti-ulcerative properties, lower blood sugar level and cholesterol, phenolic compounds are nephron protective and anti-cataractogenic, germinated seeds improved hemoglobin level in infants, protection against epithelialization, mucosal ulceration, increases the synthesis of collagen, activation of fibroblasts and mast cells, tryptophan lowers appetite and keeps weight in control, high amount of calcium strengthens bones, lecithin, and methionine eliminate excess fat from liver and thus reduce cholesterol level in the body, high amount of iron protects from anemia.
<b>Foxtail millet</b>	Soluble and insoluble bound phenolic extracts present in the seeds show antioxidant, metal chelating, and metal reducing powers, they reduce

Millet	Medicinal importance
	toxicity caused by xenobiotics and toxins in the body, high amount of proteins and essential amino acids helps in building body tissues and advised for infants and elderly people.
<b>Proso millet</b>	High amount of copper facilitates the body to form red blood cells, helps maintain blood vessels, healthy bones, nerves, and immune function, and contributes to iron assimilation. Sufficient copper in the diet prevents cardiovascular diseases and osteoporosis. Magnesium reduces respiratory problems and migraine attack, potassium controls blood pressure and relieves heart diseases
<b>Kodo millet</b>	Phenolic compounds have antiulcerative properties, lower blood sugar level and cholesterol, Magnesium and potassium control blood pressure and relieve heart diseases, magnesium also reduces respiratory problems and migraine attack
<b>Barnyard millet</b>	The richness of phenolic acids, tannins, phytates, and dietary fibers show antimutagenic and anti-carcinogenic properties, high amounts of dietary fiber reduce the risk of colon cancer and oesophageal cancer, phosphorous content helps in bone growth and development in kids
<b>Little millet</b>	High amounts of iron help to safeguard many fundamental functions in the body, including general energy and focus, the immune system, gastrointestinal processes, and the regulation of body temperature. Higher amounts of zinc aid in enzymatic reactions, immune function, wound healing, DNA and protein synthesis, and normal biological development and growth.

Source: Kumar *et al.*, 2021

#### 9.4 What Is Crop Diversification?

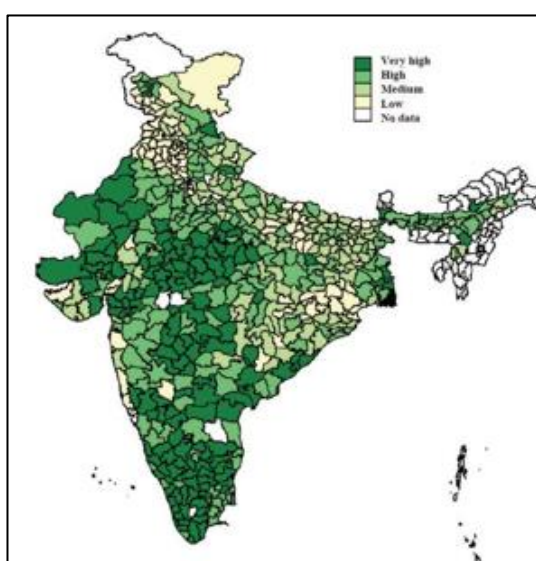
According to ICAR, “Crop diversification involves addition of new crops or cropping systems to agricultural production taking into account the different returns from value-added crops with complementary marketing opportunities. Inclusion of the new crops can be one of the important technologies in escalating the farmers’ income.

The aim of crop diversification is to increase crop portfolio so that farmers are not dependent on a single crop to generate their income”. It is a shift from less remunerative and less sustainable crop or cropping system to more remunerative and more sustainable crop or cropping system (Barman *et al.*, 2022) Shift from the regional dominance of one crop to the regional production of several crops can greatly help to reduce the vulnerability of small farmers towards climate change.

Diversification is a spatial or a temporal process of creating a heterogenous farming system through activities within or outside a farm to build resiliency of the ecosystem (Kremen *et al.*, 2012). Crop diversification may be defined as the shifting from one crop or cropping system of traditionally grown less profitable crops to another crop or cropping system that consists more profitable crops (Feliciano, 2019).

### **9.4.1 What Is the Extent of Crop Diversification Status in India?**

In India, diversification varies by regions and lower crop diversification is more common among poor and smallholder farmers. However, studies that show the connection between crop diversification and nutritional status in India are limited. District-wise diversification indices were estimated for the states considering the area under food crops. The study found that: The districts with low to medium degree of food crop diversification included the northern states of Punjab, Haryana, Jammu and Kashmir, Uttar Pradesh and Uttarakhand; the eastern states of Bihar and Odisha and central states of Chhattisgarh and Jharkhand. The southern states of Karnataka, Tamil Nadu, Kerala and the central state of Madhya Pradesh showed very high diversification index and rice, maize, pulses, oilseeds, and fruits and vegetables were the major crops cultivated in this region. As more than 90% of the land in Punjab and Haryana was planted with rice and wheat, the degree of diversification was particularly low in these states. This was also found to lead to degradation of natural resources. About 80 percent of the gross cultivated area in Odisha and Bihar was under cereals and millets, indicating low level of diversification in the region. The study found a strong negative relationship between food crop diversification and under nutrition status of the districts. Thus, higher degree of diversification within food crops was linked to the reduced probability of under nutrition. In India during 1990 the most important cause of agrarian calamity was low level of income and huge difference of income between the farmer and non-agricultural worker and it has become a serious problem in the recent years. In such condition a target has set in double the farmer`s income by 2022-23 that will help to flourish farmer`s prosperity, reduce agrarian calamities and will maintain the equality between the income of farmer and non agricultural worker. In an effort to boost the income strong measures should be taken to improve the agricultural productivity, efficient use of resources, and saving in production cost. In such condition crop diversification comes into existence to provide sustainability in the production as well as to improve farm income.



**Figure 9.2: District-Wise Diversification Index for Food Crops 2015-16. (Anuja Et AL., 2022)**

#### **9.4.2 What Is the Need of Crop Diversification and How It Can Benefit Farmers, Consumers and The Environment?**

Out of the 6,000 plant species cultivated for food globally, 66 per cent come from just 9 species, according to a 2019 report of the Food and Agriculture Organisation (FAO). These include sugar cane, maize, rice, wheat, potatoes, soybeans, oil-palm fruit, sugar beet and cassava. Titled *State of the World's Biodiversity for Food and Agriculture*, the report highlights how the mass production of some crops, driven by global demands, is depleting the biodiversity of our agricultural landscapes. As major producers of wheat, sugarcane and paddy, Indian farmlands contribute to this trend, compromising biodiversity that could otherwise thrive in our tropical climate.

Focusing on one crop or mono cropping as it's called, depletes nutrients in the soil, drains the land of water, compels the use of synthetic fertilizers and pesticides and thus negatively impacts the quality of the yield. Needless to say, it also negatively impacts those who consume it. That's not all. It limits farmers' income, increases cost of production and provides no safety net against price fluctuation or the growing threat of the climate crisis. It is time we diversify our crops with traditional farming practices such as multi-cropping and inter-cropping (growing more than one crop on a piece of land during the same season or in succession). These practices were largely abandoned during the Green Revolution to aid mass production, but we must make a concerted effort to revive them. Cropping patterns have traditionally been dominated by food needs. Commercial crops were confined to some regions and on relatively larger farms. Not just were traditions getting lost, also ignored was the looming climate change that poses a major threat for most modern crop varieties that cannot cope with the anthropocentric rise of temperature, sudden floods, erratic rainfall and such phenomenon. The system we inherited at the time of independence became unsustainable as rapid population growth outstripped our capacity to produce food.

A food insecure nation, despite devoting bulk of its agricultural resources to food production, became chronic importer of food. Even extension of cultivation to marginal and sub-marginal lands did not help. The Green Revolution transformed this scene. In less than a decade we were able to achieve reasonable food security. High growth in productivity of cereals spurred agricultural growth and incomes. Rising incomes prompted shifts in consumption patterns and demand for non-cereal food became buoyant. By mid-eighties expansion of area under cereals ceased. Producers too began to look for alternatives and the process of diversification set in. It became the mantra for agricultural development in the nineties. States which diversified the crop sector in a big way have attained relatively higher growth in the net state domestic product of agricultural sector during the past two decades. The factors that led to diversification of agriculture have varied, over time. During the first 15 years following the onset of Green Revolution, irrigation played the most important role, predominance of small holdings discouraged it. Abundant and cheap supply of electricity also fostered specialisation. Since early eighties, credit availability emerged as a significant determinant of diversification. Smaller farms continued to face rigidity in cropping patterns because of binding food production constraint. In this scenario, diversification paves the new pathway for income growth in agricultural and rural sector.

This would also help in bridging the quality gaps in terms of nutrition. the expansion of the agriculture industry is a vital tool for escaping poverty in most developing countries,



particularly among the rural poor with small or no lands (World Bank, 2008). Diversifying crops is an important strategy having several benefits, including reducing the reliance on a single crop, reducing the risk of crop failure besides increasing soil fertility, improving soil health, reducing pest and disease pressure, and increasing farm income by having a variety of crops to sell. With widespread cultivation of major cereal crops, there has been a reduced focus on domesticating the minor crops which enhance human health and build the resilience within the people. Through its constant efforts and steps like green revolution, India has been able to mitigate the hunger problem to some extent but failed in providing the necessary nutrients which are needed for all round development of an individual, due to which a big chunk of population still remains undernourished. In recent years, there has been a renewed interest in crop diversification as a sustainable agriculture strategy, and it has become an essential component of many agricultural policies and programmes.

Crop diversification is also less water intensive and therefore does not drain the water of the land. Additionally, it brings down the use of chemical fertilizers making the yield healthier for consumption. Promote diversification among food crops to improve the nutritional outcomes of districts showing under performance. Crop diversification can directly influence the access, variety and affordability of a diverse diet (Ecker *et al.* 2011; Chinnadurai *et al.*, 2016). It is positively correlated with the household-level food consumption by improving the quantity and variety of food (Mango *et al.*, 2018; Adjimoti and Kwadzo, 2018). Lack of a diverse diet leads to an increase in the proportion of malnourished people (Johns and Sthapit, 2004). Higher crop diversification also increases the resilience of households to short-term agricultural shocks (Mofya-Mukuka and Kuhlgatz, 2015).

This system has usually been done by the farmers to enhance nitrogen in the soil and to replenish the soil fertility, and thus maintenance of a good crop rotation. This generates more employment as the farmers including family labourers and agricultural workers remain busy in different farming operations of different crops throughout the year. Crop diversification helps divide the risk posed by fluctuating market prices. If in one season one crop does not perform well, the farmer can sail through by the income brought in by the second / multiple crop mix in that year. And when both the crops get a good price, there is also an opportunity to maximize the earnings.

### **9.4.3 Why Millets Are Reliable Choice in Crop Diversification?**

Here's how crop diversification by including millets can help restore the ecological balance, boost farmer income and provide us a more nutritious meal.

- A. Nutritious:** They are very nutrient-dense and abundant in minerals, fibre, and protein. They are also gluten-free, so those who have a gluten allergy can eat them. They are a great source of micronutrients including iron, calcium, and magnesium, which are frequently lacking in the diets of poor communities. They also contain a number of vital amino acids.
- B. Drought Resistance:** They may be cultivated in regions with little rainfall since they are extremely drought-resistant. They are hence the perfect crop for dry land farming and for drought-prone locations.

- C. Low input requirement:** In contrast to other cereal crops like rice and wheat, they require less input like water, fertiliser, and pesticides. They are thus a financially sensible choice for farmers.
- D. Reduce Risk:** Farmers can lower the likelihood that their crops will fail due to unfavourable weather, pests, or illnesses by varying their crop rotation. As millets are well known for their resilience to unfavourable climatic circumstances, they make a fantastic crop for agricultural diversification.
- E. Increase Income:** Farmers may boost their revenue by selling various crops at different periods of the year by diversifying their crop production. Millets are in high demand worldwide and may help farmers make a decent living.
- F. Economic Benefits:** They are in high demand on the market and may bring in good revenue for farmers. They are a cost-effective crop for farmers because of their minimal input needs and cheap cost of production.
- G. Soil Health:** Through lowering soil erosion, raising soil organic matter, and enhancing soil structure, they are known to enhance soil health. The production of other crops planted in the same field may benefit as a result.
- H. Food Security:** They are a significant source of nourishment for several millions of people worldwide. Crop diversification can increase food security by encouraging the growth of millets.
- I. Gluten-Free:** They are naturally gluten-free, makes them a great option for peoples with gluten allergies or gluten intolerance.
- J. Low Glycemic Index:** Because to their low glycemic index, they release glucose into the circulation gradually, limiting sharp increases in blood sugar levels. As a result, they are a nutritious meal option for those with diabetes.
- K. Eco-friendly:** Compared to other cereal crops, they require less input like water, fertiliser, and pesticides, making them a more ecologically friendly crop. Also, they are ideally suited to organic agricultural methods.
- L. Crop Diversity:** Millets are grown because they encourage agricultural variety, which can reduce the dangers of monoculture and dependency on a single crop. Crop diversification can also aid in enhancing soil health and lowering pest and disease occurrence.
- M. Affordable and Accessible:** Because to its low input requirements for resources like water, fertiliser, and pesticides, millets are economical and accessible to small-scale farmers and underprivileged communities. They are an important food source during times of food shortage since they can be kept for extended periods of time.
- N. Climate Resilience:** As millets are C<sub>4</sub> plants, they efficiently utilise nutrients and water for development. They can resist severe weather conditions including heat waves, floods, and droughts. In areas vulnerable to such climatic calamities, this can assist assure food security. They produce exceptionally excellent plant stands during the seedling and germination phases because to their resistance to salt. Millets are the most potential sources of food under climate change because they have physiological mechanisms for quick recovery from abiotic challenges like heat and drought.
- O. Medicinal value:** Millets are chosen over other main wholegrain cereals due to their better nutritional qualities and a number of health advantages. These qualities are due to their richness in polyphenols, dietary fibres, non-glutinous, and non-starchy carbohydrate content.

#### **9.4.4 Constraints in Crop Diversification:**

Although millets have been called the poor man's crop and are a staple food for more than 60% of the world's poor, their productivity remains a major obstacle to their widespread cultivation. This obstacle must be overcome by stepping up efforts to use germplasm that is widely accessible to create high yielding varieties that have all the desirable morpho-physiological characteristics and superior agronomic traits. Also, in order to attain food and nutritional security, commercial and public entities have made significant innovations in millets' cultivation, value addition, and marketing. Moreover, recent study has focused more on utilising millets' nutraceutical properties and bio-fortifying them in order to use them in the battle against malnutrition, micronutrient deficiencies, and other health-related illnesses. Even though the demand for millets and millet-based food products is increasing in national and international markets, the area under cultivation is not seeing any rise because of changing climatic conditions, non-availability of improved high yielding varieties and hybrids that are apposite for mechanized farming, lack of favourable government policies to support cultivation and marketing of millets, non inclusion of millets in public distribution system and not fixing minimum support price for millets.

In contrast, it was discovered that the lack of price incentives and input subsidies, the subsidised supply of fine grains through PDS, and changes in consumer tastes were the primary causes of the decline of millets crops in India. Because of the small market and lack of market connections for less well-known products, millet growing remains difficult. Governments must assist in establishing a strong network of connections that can guarantee smallholder farmers will be capable to sell their products in the right markets. As an alternative, develop a hyper-local ecosystem that will make it easier to acquire and sell fresh food at the neighbourhood market.

#### **9.5 Conclusion:**

A variety of agro-climatic conditions may be found in India. Different crops are grown in various regions due to these variances. Higher yields have been seen thanks to the advance of new technology including irrigation systems and other agronomic methods. Crop diversity is a novel way to keep agricultural output sustainable. It aids in raising production's quality, quantity, and revenue in order to safeguard farmers' financial situation. Crop diversification should adhere to a plan to increase output, employment, and input efficiency. Millets are an important crop for crop diversification. They are highly nutritious, require low inputs, are resilient to adverse weather conditions, and can improve soil health. By promoting the cultivation of millets, crop diversification can help enhance food security, reduce risks, and increase income for farmers. The cultivation of millets can help mitigate the risks associated with monoculture and the dependence on a single crop. Millets should be given due importance in agriculture policies and programs for achieving sustainable agriculture and food security.

Crop diversification if adopted well can be a win-win situation that will benefit the producer, consumer and the environment. Further, as farmer's worldwide experience more frequent drought and erratic rainfall linked to climate change, the race to find and improve drought-resistant crops grows ever more important.

Hence, naturally resilient plants that can endure very demanding environmental circumstances are a priority. Millets can thrive under drought circumstances, without irrigation, even in very low rainfall regimes, and have a lower water footprint than more well-known cereals like wheat, rice, or maize. Due to their nutritional density and ability to reduce the stress of food insecurity, these crops are also referred to as "super food crops." Broader cultivation of these minor crops will diversify plant agriculture and the human diet, and will therefore help to improve national food security and human health.

Therefore, boosting millet cultivation will empower the average farmer and achieve the objectives of enhancing incomes and improving crop diversification. With the purpose of minimising over-reliance on more widely cultivated crops, promoting diversified diets, and ensuring food security, there has to be a renewed emphasis on increasing millets' production and publicising their advantages. According to Dr. Nancy Aburto, a specialist in agriculture at the Food and Agriculture Organization, this is particularly true when food is in short supply due to natural disasters (FAO).

In conclusion, millets' planting and use can significantly contribute to boosting food security and strengthening the nutrition of disadvantaged groups. To increase demand for all foods, including locally grown fruits, green leafy vegetables, cereals, pulses, and millets, we must continue to expand our palates beyond the basic staples. It will boost the nutritional value of our food and inspire our farmers to plant a wider variety of crops.

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