



ISSN: 2582-6344

Times of Agriculture

A Resonance in Agriculture

A Monthly e-Magazine

**Food & Nutrition
Special Issue**

September, 2021



Proso Millet



Timesofagriculture.in

FROM THE EDITOR'S DESK

For all you intellectual readers, a special issue is being published by **Times of Agriculture e-magazine** on the occasion of **Indian Nutrition Month**. As we all know that the Government of India has set a target to celebrate the month of September every year as **Nutrition Month**, whose purpose is to draw everyone's attention towards malnutrition.

The Prime Minister has also explained it in this way in his own words: - This **POSHAN Abhiyaan** draws the attention of the country towards the problem of malnutrition and its objective is to solve it in a mission-mode. This month throws light on the importance and role of proper nutrition for the human body. A balanced diet with a combination of essential nutrients and calories is vital for the smooth functioning and development of the human body.

With this theme, let us all take a pledge to end malnutrition from our country and consider every month as a nutrition month and take care of our food and drink. Hope, you all the readers will get to learn and know a lot from this special issue and we will all make proper arrangements for both malnourished and malnutrition through **Poshan Maah**.

Thank you so much for all your love

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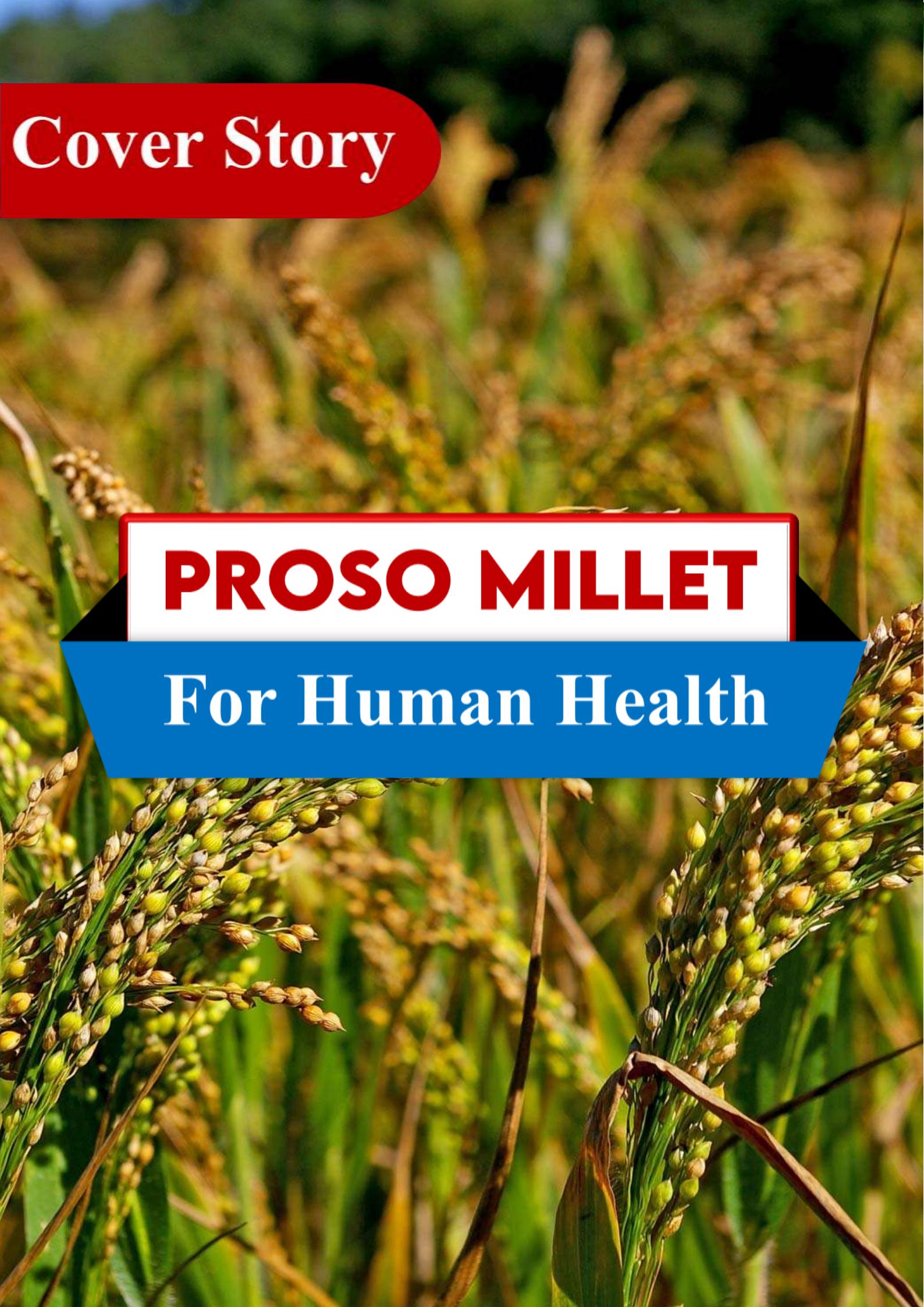
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Cover Story

PROSO MILLET

For Human Health



Proso millet (PM) is popularly known as **Broomcorn millet** (China), **Common millet** (USA), and **Barri** (India). It was introduced in north America in 1875 by the German –Russian immigrants.

PM is an under-utilized crop although **one-third of protein and energy** in developing countries are derived from it. The major market share for PM is contributed by birdseed industries. **Irrespective of several health benefits, including gluten-free, low glycemic index, high protein, and fibers**, PM is still struggling to enter human food markets. Recent increases in **gluten-free trends and escalation in health consciousness** among people have created renewed interests in ancient grains.





The human food market for PM has found its way to different breakfast cereals, bakery products, fermented products and brewing. Promotional marketing, research for the development of new varieties, and awareness among farmers and consumers are necessary to revive the lost ancient trend where PM was common in cuisines of different communities.

Millets are annual small-seeded cereal crops grown all over the world for food, feed, forage and fuel. **Millet is the world's sixth most important cereal grain supporting as a major source of energy and protein for millions of people in India, Africa, and China, and especially for the people living in arid and semiarid regions.** Millets are cultivated globally with major contributions from India, Nigeria, Niger, China, Mali and Burkina Faso. Asia (48%) and Africa (48%) dominate the production of millet compared to Europe (3%) and America (1%).



Commonly cultivated Millets



Proso millet

Panicum miliaceum L.



Pearl millet

Pennisetum glaucum L.



Finger millet

Eleusine coracana



Kodo millet

Paspalum scrobiculatum



Foxtail millet

Setaria italic L.



Little millet

Panicum sumatrense

Nutritional quality is the key element that determines the dietary importance of a grain and its importance towards human health. PM is known for several health benefits. It has high nutritive value. Moreover, PM has a **low glycemic index (GI) compared to rice, wheat, and barley, which makes it an ideal food for people with type-2-diabetes mellitus and cardiovascular disease (CVD)**. Products prepared with **100% PM showed GI (%/g) of 50–65 compared to 70–80 of refined corn and wheat-based products.**

Sedentary lifestyle and food habits are the primary cause of diabetes, obesity and cardiovascular diseases. Therefore, dietary modification is an important preventive and protective measure against all metabolic disorders.



Nutritional Composition : Proso millet



Proso Millet as Human Food and Health Benefits

- PM protein (PMP) has an important role in cholesterol metabolism as they can increase concentration of the high-density lipoprotein (HDL) cholesterol level, especially the isomer HDL2, and adiponectin without affecting the concentration of low-density lipoprotein (LDL) cholesterol. Adiponectin is important in accelerating insulin sensitivity and promotes lipid metabolism.
- Elevated levels of HDL in bloodstream also can help in maintaining blood LDL level and can protect endothelium or inner walls of blood vessels from any damage. Damage to inner walls of blood vessels is considered as the first step in the process of atherosclerosis, which is the reason for heart attack or stroke.
- PMP also downregulate tumor necrosis factor alpha (TNF α) and increase insulin sensitivity as both are negatively correlated.



- **Dietary improvement and avoidance of gluten is the only nutritional therapy available for a person suffering from celiac disease.** As in this disease, people are allergic to gluten (a protein found in the wheat, rye, barley, oats etc.) but not in Proso millet.
- PM contains a **high amount of lecithin which plays an important role in the neural health system by repairing and regenerating myelin fiber and intensifying brain cell metabolism.**
- High content of fibre and antioxidants in PM is also valuable in **prevention of CVD and cancer.** A study showed antiproliferative properties of **PM against MDA** (originally isolated as part of the MD Anderson series of breast cancer cells; hence MDA) **human breast cancer and HepG₂ human liver cancer cells.**



Proso millet is a **wonder grain** that has several environmental and health benefits. Adoption of a PM-based diet can potentially **prevent deterioration of human health resulting from a sedentary lifestyle.**

PM may help keep fat at bay by **lowering the risk of cardiovascular disease and type 2 diabetes.** Despite of a number of research publications stressing possible health advantages, industrial application of PM still faces stiff competition. To promote its extensive applicability in various market sectors, studies specifying diverse processing methods and food applications are required. For widespread acceptance and consumption, further market research and marketing of this alternative crop for a healthy diet and lifestyle are required.



About the Author

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NUTRITIONAL THERAPY IN CARDIO VASCULAR DISEASES



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Heart disease or cardiovascular diseases is the class of diseases that involve the heart or blood vessels (arteries and veins). While the term technically refers to any diseases that affects the cardiovascular system. It is usually used to refer to those related to atherosclerosis (arterial disease). These conditions have similar causes, mechanisms and treatments.

Atherosclerosis

Atherosclerosis is the narrowing of arteries caused by a build-up of plaque, also called arteriosclerosis or hardening of arteries.

Plaque is made up of “cholesterol, lipoprotein, fat, calcium, cellular waste and other substance”. Build-up of plaque makes it difficult for the blood to flow through arteries. The build-up can occur in any artery and result in shortage of blood and oxygen in various body organs known as ischemia.

There are four stages of development.

Stage I

Arthrosclerosis is firstly seen as fatty streaks or spots. These are thickening of intima which appears as a slightly raised, flattened yellow streaks usually running longitudinally along the vessel.

Stage II

Fibrous Plaque (develops between intima & media, these are elevated intimal thickening, which are irregular in shape.

Stage III

Large plaques project into sufficiently to block the flow of blood in artery of medium size. Gradually plaque becomes soft.

Stage IV

Finally the surface of plaque breaks down and an atheromatus ulcer with ragged irregular edges develops.

Sign and Symptoms- The specific signs and symptom depend on which artery is blocked.

- 1) **Heart-** Obstruction of coronary artery may cause chest pain (Angina) and heart attack.
- 2) **Neck-** Obstruction of carotid artery in neck may cause symptoms of stroke such as sudden numbness, weakness, dizziness.
- 3) **Arms & Legs –** Obstruction of arteries to arms and legs may cause symptoms of peripheral arterial diseases such as leg pain when exercising.
- 4) **Shortness of breath**
- 5) **Fatigue**
- 6) **Confusion,** if arteries that carry blood to the brain are clogged.

Diet and atherosclerosis

Several factors are known to interact and result in atherosclerosis. In the epidemiological triangle, host factor, environmental factors and the agent namely the lipid profile and blood clotting system (thrombosis) play a significant role in the atherosclerotic process. Altered metabolism of lipids (fatty material) and lipoproteins result in increased levels of lipids, mainly cholesterol and triglycerides in blood which accumulate and thicken the wall of the blood vessels. This abnormality plays a critical and decisive though not an exclusive role in the development of atherosclerosis. Consequent to and concomitant with the injury caused to the blood vessel by the deposition of excess of lipids, platelets (a type of cells in blood) and blood clotting system



contributes to the formation of blood clot (arterial thrombus).

All these processes may be active for decades in individuals without any clinical manifestation and are identified as disease.

Etiology

Non-controllable factors (Which are beyond the control of the individual?).

Age: Risk increases with increasing age.

Sex: Risk is greater for men than for premenopausal women.

Family or genetic history: Risk is greater in people where there is family history of atherosclerosis in early age.

Controllable factors:

(Which can be controlled at least partially?)

- Cigarette smoking: Smokers suffer from severe atherosclerosis.
- Those who discontinue smoking have a lower risk.
- With passage of time an ex-smoker's chance of getting heart attacks decrease.
- High blood pressure: Increases the risk, keeping BP under control either by drugs or sodium-restricted diet decreases the risk of Atheros.
- Exercise: Sedentary (non-active) life style increase the risk as comparable to life style which provides regular exercise at work or play.
- Stress: May play a role in Atheros.

Diet

The type of diet has an important role in the development and progression of atherosclerosis. Alteration in blood lipids and subsequent reactions of thrombosis are in fact the end results of dietary habits over decades. Often dietary practices directly result in increased levels of lipids in blood or trigger an underlying genetic tendency to atherosclerosis.

Cholesterol

Cholesterol in blood is derived from two sources namely, diet and endogenous synthesis (mainly liver and gut). Only 25-50% of the ingested cholesterol (200-1000 mg/day) is absorbed. However, if dietary

intakes of cholesterol are markedly increased, the absorption is also significantly elevated. Dietary cholesterol inhibits the endogenous synthesis of cholesterol. This feedback inhibition shows wide individual variation. Cholesterol is excreted into the bile as cholesterol and bile acids. These are eliminated through faeces. The excretion of cholesterol and bile acids are known to increase with rise in dietary cholesterol.

The extent of effect of dietary cholesterol on blood cholesterol in human beings varies from individual to individual. This responsiveness depends on the extent to which dietary cholesterol interacts with the cholesterol homeostasis (absorption, feedback inhibition and excretion) in each individual. The effect of dietary cholesterol on blood cholesterol levels is also influenced by the nutrient composition of diet.

Blood cholesterol is an important risk factor for atherosclerosis and persons with high levels of cholesterol in blood have a greater chance of suffering a heart attack than those with lower levels. Cholesterol is transported in blood as lipid protein complex called lipoproteins. Lipoproteins have been named according to their density, each having a distinct physiological role. The low density lipoprotein (LDL) carries cholesterol from the liver to all the organs of the body including blood vessels and heart. Increase in LDL cholesterol increases the risk of atherosclerosis. The high density lipoprotein (HDL) helps to mobilize the cholesterol depots from the tissues. In other words HDL acts as a scavenger and prevents the accumulation of cholesterol in the blood vessels and heart. Increases in HDL cholesterol are associated with decreases in the risk of atherosclerosis. It is therefore emphasized that in addition to total cholesterol in blood, its distribution in LDL and HDL is also important in predicting the risk of atherosclerosis in an individual or a population.

Fat

The amount and kind of fat in the diet affects the levels of lipids in blood as well as thrombosis. Fats



may be divided into three major classes identified by saturation and unsaturation of their fatty acids.

Saturated fatty acids

All animal fats (butter, Ghee) are highly saturated except for those which occur in fish and shell fish. Coconut oil and hydrogenated vegetables are also rich in saturated fatty acids.

Monosaturated fatty acids

These are present in all animals and vegetable fats.

Essential Fatty Acids (EFA)

These are not synthesized in the body unlike saturated and monosaturated fatty acids. They have to be obtained through diet. There are two types of EFA namely linoleic (Omega 6) and linolenic (Omega 3) acids. The ingested EFA are converted to fatty acids of longer chain length and with more number of double bonds. The EFA and their longer chain derivatives are popularly referred to as polyunsaturated fatty acid (PUFA).

Effects of dietary fat on blood cholesterol

High fat diets as well as saturated fats increase the level of blood cholesterol, though monosaturated fats have no such effect. Linoleic acid and its PUFA result in negative cholesterol balance. Reduction in blood cholesterol is more easily achieved by reducing saturated fat than by Omega 3 PUFA present in fish and fish oil lowers the levels of cholesterol and also triglycerides in blood. It has been observed that on gram for gram basis, the omega 3 PUFA of fish oil has a greater cholesterol lowering effect than the omega 6 PUFA.

Effects of dietary fat on thrombosis

In addition to its effects on blood lipids and lipoproteins, dietary fat has a direct effect on platelets and coagulation system. Saturated fats make the platelets more sticky (promote platelet aggregation). Also saturated fats activate the coagulation system. Both these processes favour thrombus formation. In platelets and blood vessels the omega 6 PUFA are converted to an important class of biological regulators known as prostaglandins (epicosanoids).

The prostaglandins have an important role in vascular homeostasis. The net effects of the prostaglandins that are formed from omega Omega 3 PUFA present in marine oils have a greater antithrombotic effect as compared to the Omega 6 PUFA.

A proper balance of the different fatty acids plays a significant role in maintaining the blood lipid levels and thrombotic tendency. It is suggested to have a variety in the kinds of fat consumed instead of consuming one edible oil as the chief source of visible fat. Thus it is important to be conscious of the quantity as well as quality of fat consumed.

Calories

Excessive intake of calories from any source namely, carbohydrates, proteins, fat or alcohol increases the levels of triglyceride and cholesterol in blood.

Carbohydrates: refined foods and fibre

Large quantities of sucrose increase triglyceride levels. A decrease in the consumption of sucrose (sugar) is therefore recommended for people in the high risk group. Dietary fibre found in unprocessed cereals, legumes, vegetables and fruits, contributes bulk to the diet and therefore helps in keeping calorie intake low. The effect of dietary fibre depends on the type. Wheat fibre does not decrease blood cholesterol but viscous types like pectins and guar gums in large doses lower plasma total cholesterol and LDL cholesterol levels. Refined flour, sugar and in general refined foods are known to increase the level of cholesterol and triglycerides in blood.

Protein

Vegetable proteins have a cholesterol lowering effect. Therefore, consumption of more plant foods may be beneficial to patients with increased lipid levels in blood.

Drinking water

CHD mortality has been found to be lower in areas where drinking water is hard than in soft water areas. The minerals and trace elements present in hard water play a protective role.



General Dietary guidelines

1. Energy intake should be in balance with energy expended.
2. Intake of total fat and saturated fat should be moderate. This is preferably achieved by avoiding ghee, butter, cream and egg yolk. Since cereals and pulses alone contain half of the total fat intake in Indian diets, the intakes of visible fat may be maintained around 10-15% of the energy (20-30 gms per person per day).
3. The visible fat should be obtained from vegetable oils. Instead of using one type of oil as the sole source of visible fat it is desirable to have a variety in the type of vegetable oils consumed. This will ensure a balance in the intakes of various fatty acids.
4. Vegetable oils are rich in linolic acid (Omega-6) PUFA and Omega-3 types should also be consumed. These are obtained from green leafy vegetables. Desirable amounts of Omega-3 PUFA can be obtained by consuming sea foods once or twice in a week in place of other non-vegetarian foods.
5. Intake of empty calories (sugar) should be reduced. Foods that contain complex carbohydrates and fiber (whole grain products, pulses, vegetables and fruits) should be preferred.
6. High sodium and alcohol intake should be avoided.
7. Food should not be consumed as one or two meals. One meal per day increase the blood cholesterol and triglyceride level significantly, as compared to the levels for the same amount of food consumed in four meals.
8. Since risk factors are additive, at least those factors which can be manipulated either by diet or change in habits should be encouraged.

Low Cholesterol Diet

S. No.	Group	Avoided	In Moderation	In Large Portion
1	Milk	Buffalo milk Cheese Khoa Cream	Fat free low milk Double toned Toned Paneer (low fat)	Skimmed milk Buttermilk (diluted)
2	Meat, Fish & Poultry	Red Meat Egg York Pork Kidney Liver Lamb Sardines Seafood	Chicken (80 gms.) Fish (60-100 gms) Egg white: 2-4 times a week	
3	Vegetables/ Pulses	Cooked in extra oil, butter/cream	Cooked in less Oil, polished Pulses	Salad Sprouts Whole pulses Green leafy Vegetable
4	Cereals	Fried Egg: Puri	Refined Preparation with white flour	Whole wheat products



5	Fruits	High calories Fruits Mango Banana Cheeku Grapes	All others 200-300 gms/ day	Juice: Tomato Lime
6	Fats	Butter, Ghee, Vanashti Cream	Refined Oil Olive Oil Mayonnaise	
7	Sugar	1 tsp		
8	Foods (others)	Fried Puddings Cakes Pastries Desserts Pickles	Nuts	Juices Rasam Clear soup Plain soda Fat free pickles

Low Cholesterol Diet Menu

500 mg: Cholesterol Diet

Morning	Tea (Skimmed milk)	1 cup
Breakfast	Milk (Skimmed) Toast/ Brown bread Butter Fruit	1 cup (150 ml) 2 slices $\frac{1}{2}$ tsp 1
Lunch	Salad Rice/ Chapati Vegetable Daal (Whole pulse) Curd	1 80-100 g 1 katori (50 g) 100 gms
Tea	Tea Light snack (Murmure), Roasted Channa	1 cup Avoid fried snack
Dinner	Salad Rice/Chapati Vegetable	1





SPIRULINA AND IT'S HEALTH BENEFITS



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Spirulina is an algae and now a days it is consuming by humans and animals. Due to its high nutritional value it is using as a space protein and also use to cure malnutrition such as

protein energy malnutrition, anaemia. It is also useful in improving blood glucose level, blood pressure, prevention of kidney and liver, removal of heavy metals from body, radioprotection, immune protection and so on. As we all know every coin have two sides so there are few adverse effects are associated with the use of spirulina. Consumption of spirulina may cause headaches, allergic reactions, muscle pain, sweating, and insomnia in some cases. People with allergies to seafood, seaweed, and other sea vegetables should avoid spirulina and having a issues related to a thyroid condition, an autoimmune disorder, gout, kidney stones, phenylketonuria, or are pregnant or nursing, spirulina may not be appropriate them.

Introduction:

Spirulina may be a biomass of blue-green algae (blue-green algae), are often consumed by humans and animals. It is cultivated worldwide, Arthrospira is used as a dietary supplement or whole food. It is also used as a feed supplement in the aquaculture, aquarium, and poultry industries.

The dried cells of microorganisms such as bacteria, fungi, yeasts and algae that are grown in large-scale culture systems as proteins, for human or animal consumption are collectively known as single cell proteins.

Spirulina (Arthrospira) is blue-green algae found in alkaline Lakes around the world. The name "spirulina" comes from the Latin word for "helix" or "spiral", relating the natural object of the organism. It's motile cellular thready eubacterium and reproduces by binary fission.

Historical Use of Spirulina:

Spirulina was a food supply for the Aztecs and alternative Mesoamericans till the sixteenth century; the harvest from Lake Texcoco in North American country and sequent sale as cakes were delineate by one among Cortés' troopers. The Aztecs referred to as it tecuitlatl.

Spirulina was found in abundance at Lake Texcoco by French researchers within the Nineteen Sixties, however no relevance its use by the Aztecs as a daily food supply was created once the sixteenth century, most likely as a result of the debilitating of the encompassing lakes for agriculture and concrete development. The subject of tecuitlatl that was discovered in 1520, wasn't mentioned once more till 1940, once the Belgian phycologist capital of South Dakota Dangeard mentioned a cake referred to as dihe consumed by the Kanembu tribe, UN agency harvest it from Chad within the African nation of Chad.

Dangeard studied the dihe samples and located it to be a dried puree of the spring kind of the eubacterium from the lake. The dihe is employed to form broths for meals, and additionally



oversubscribed in markets. The spirulina is harvested from little lakes and ponds around Chad.

During 1964 and 1965, the phytologist Jean Dutch Leonard confirmed that dihe is formed from spirulina, and later studied a bloom of alga during a caustic soda production facility. As a result, the primary systematic and elaborated study of the expansion needs and physiology of spirulina was performed as a basis for establishing large-scale production within the Nineteen Seventies.

Nutritional Value:

Spirulina is one in every of the natural sources containing the very best quantity of macromolecule — 5 times that of meat. Spirulina provides the bulk of essential and nonessential amino acids. It is a reasonably well-balanced organic compound pattern and contains the very best quantity of provitamin A, a precursor of axerophthol. It's the sole vegetable supply of vitamin B having 2 and 0.5 times the quantity in liver. It's additionally the supply of the essential carboxylic acid carboxylic acid that is that the precursor of hormones concerned in regulation of body functions.

General Composition of Spirulina

Nutrient	Nutritive value
Energy	290 Kcal
Protein	57.47 g
Carbohydrates	23.9 g
Lipids	7.72 G
Vitamin A	29 µg
Vitamin B ₁	2.38 mg
Vitamin B ₂	3.67 mg
Vitamin B ₃	12.82 mg
Vitamin B ₅	3.48 mg
Vitamin B ₆	0.364 mg
Vitamin B ₉	94 µg
Vitamin C	10.1 mg
Vitamin E	5 mg
Vitamin K	25.5 µg
Calcium	120 mg
Iron	28.5 mg
Magnesium	195 mg

Manganese	1.9 mg
Phosphorus	118 mg
Potassium	1363 mg
Sodium	1048 mg
Zinc	2 mg

Nutrient Profile of Spirulina vs Other Foods:

- 180% more calcium than whole milk.
- 670% more protein than tofu.
- 3100% more beta carotene than carrots.
- 5100% more iron than spinach.
- More antioxidant and anti-inflammatory.
- Activity in 3g of Spirulina than in five servings of fruits and vegetables.

Health Benefits of Spirulina:

Health benefits of spirulina Research on spirulina's health benefits have been far-ranging. In addition to antioxidant and anti-inflammatory effects other potential health applications are:

- Protection of the liver and kidneys
- Improvement of blood quality and prevention of anaemia
- Benefits for diabetes
- Reduction in Blood Pressure
- Removal of heavy metals from the body
- Radioprotection
- Prevention of liver and renal toxicity
- Antioxidant action
- Immune protection
- Relief in allergic reactions

Safety and Toxicology:

Spirulina is an algae and used as a space protein but there are few adverse effects are associated with the use of spirulina, consuming spirulina may cause headaches, allergic reactions, muscle pain, sweating, and insomnia in some cases. People with allergies to seafood, seaweed, and other sea vegetables should avoid spirulina.

People having a thyroid condition, an autoimmune disorder, gout, kidney stones, phenylketonuria, or are pregnant or nursing, spirulina may not be appropriate for them. □



Garcinia cambogia :

A SECRET FOR WEIGHT LOSS?



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(U.P.)



and shares culinary uses with the tamarind (*Tamarindus indica*).

- The latter is a small and the former a quite large evergreen tree.

- *G. gummi-gutta* is also called goraka or, in some areas, simply kattcha puli (souring fruit).

- It is called uppage in Kannada language and fruits are collected and dried for selling to dealers in Sirsi, Karnataka.

Scientific Classification of *Garcinia Cambogia*

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malpighiales
Family	Clusiaceae
Genus	<i>Garcinia</i>
Species	<i>G. gummi-gutta</i>

How does it work? – “The Weight Loss Hype”

- *Garcinia cambogia* is primarily marketed as a way to lose weight naturally with little to no additional effort.
- Some companies even claim that this supplement can help people lose weight without additional exercise or dieting.
- In late 2012, a United States celebrity doctor, Dr. Oz, promoted *Garcinia cambogia* extract as "an exciting breakthrough in natural weight loss".



- The rind of *Garcinia Cambogia* contains a chemical called hydroxycitric acid (HCA), which has been studied for its effect on appetite.
- Garcinia cambogia* supplements with HCA are marketed for weight loss.
- The active ingredient in the fruit's rind, hydroxycitric acid, or HCA, appears to block an enzyme called citrate lyase, which your body uses to make fat.
- It also raises levels of the brain chemical serotonin, which may make you feel less hungry.
- It is sold in the form of capsules, extracts, tea or mixed with herbal drinks and juices.

Culinary Uses of *Garcinia cambogia*

- Garcinia gummi-gutta* is used in cooking, including in the preparation of curries.
- The fruit rind and extracts of *Garcinia* species are called for in many traditional recipes, and various species of *Garcinia* are used similarly in food preparation in Assam (India), Thailand, Malaysia, Burma, and other Southeast Asian countries.
- The extract and rind of *G. gummi-gutta* is a curry condiment in India.
- It is an essential souring ingredient in the southern Thai variant of kaeng som, a sour curry.

How safe is it to use? Potential Risks

Garcinia cambogia is considered safe to eat, though there are some risks and considerations to keep in mind before using the fruit or its extract as a dietary supplement.



Potency

- The United States Food and Drug Administration (FDA) do not regulate supplements, such as *garcinia cambogia*, in the same way as pharmaceutical drugs, which must meet stringent safety standards.
- As a result, manufacturers of herbal supplements only need to make their products safe to eat and provide clear labels.
- It is hard to determine how effective *garcinia cambogia* or HCA is because the supplement can vary in potency from brand to brand.
 - Some manufacturers may also include other synergistic or filler ingredients into a blend, making it even harder to determine the proper dose.

Side Effects

Anyone choosing to take *garcinia cambogia* should be aware of the potential side effects.

Side effects of *Garcinia cambogia* may include:

- Headache
- Nausea
- Skin rash
- Common cold symptoms
- Digestive upset
- Lower blood sugar
- Certain products containing *garcinia cambogia* and HCA have also been linked to liver damage.

Interactions

Garcinia cambogia may interact badly with certain drugs such as:

- Diabetes medicines, including pills and insulin
- Pain medicines



- Prescriptions for psychiatric conditions
- It is not advisable to use it when
- A woman is pregnant or nursing,
- If a person has liver or kidney problems. It is possible that manic symptoms may emerge as a side effect.

Dosing

There is no standard dose when it comes to supplements.

Suggested Dosing includes:

- 800-1000 mg standardized extract orally twice daily.
- Standardized extract 50% hydroxycitric acid (HCA): 500 mg four times daily.

The best dose to take will vary significantly from person to person, and people should always discuss their options with a doctor beforehand.

Conclusion - Is it Worth it?

Garcinia cambogia has been used for centuries. The fruit is safe to eat, and the supplements have helped many people lose weight. However, clinical evidence of its efficacy is mixed at this point. *Garcinia cambogia* has been studied for weight loss, but there aren't a lot of recent, reliable studies on its effectiveness and there is no

convincing evidence that *Garcinia cambogia* will help you lose weight or control cholesterol.

Some studies using HCA have produced amazing weight loss results, while others showed the supplement had little to no effect.

Also, Researchers note that the majority of the studies done on garcinia or HCA used animal models. The little research that has been done on humans has found that the effects of the fruit are too widespread to call beneficial. It may work, and it may not.

So, the bottomline is that if a person is considering taking *garcinia cambogia* as a supplement, they should research it well and discuss it with a doctor before starting.

Weight loss miracle pills often sell a future that does not exist. Maintaining a healthful diet and taking regular exercise are still two of the best ways to improve body weight. Supplements may help these efforts, but nothing will replace these important staples in a healthy lifestyle.



IRON DEFICIENCY ANEMIA: MANAGEMENT STRATEGIES



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insufficient to fully support production of erythrocytes. Iron deficiency anemia (IDA) remains amongst the five leading causes of years lived with disability in humans, and the top cause in women. Although it has been mainly regarded as a public health concern affecting growing children, premenopausal and pregnant women, it is also being increasingly recognized as a clinical condition that can affect patients presenting to various medical and surgical specialties, especially those with chronic

Criteria of Assessment:

Table 1. Haemoglobin and haematocrit levels below which anaemia is present in a population:

Age or gender group	Haemoglobin		Haematocrit	
	g/l	mmol/l	l/l	l/l
Children 6 months to 59 months	110	6.83	0.33	
Children 5–11 years	115	7.13	0.34	
Children 12–14 years	120	7.45	0.36	
Non-pregnant women (above 15 years of age)	120	7.45	0.36	
Pregnant women	110	6.83	0.33	
Men (above 15 years of age)	130	8.07	0.39	

Conventional conversion factors: 100 g haemoglobin = 6.2 mmol haemoglobin = 0.30 l/l haematocrit. Adapted from reference (89), by splitting the age group for children 5–14 years and applying a haemoglobin cut-off level for those 5–11 years which has been lowered by 5 g/l to reflect the findings in non-iron-deficient children in the USA.

Source: World Health Organization. (2001). Iron deficiency anemia. assessment, prevention, and control. A guide for programme managers, 47–62.



Aetiology:

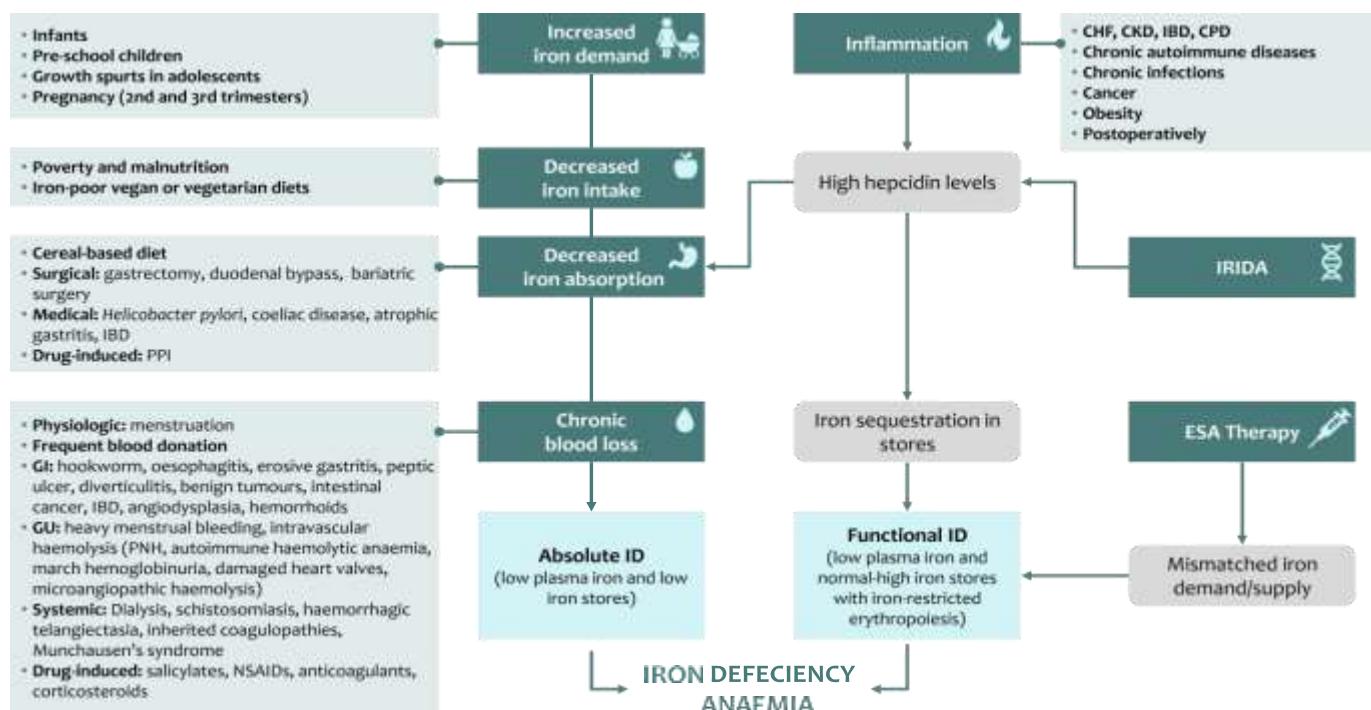


Fig. 1 Various aetiologies of iron deficiency anaemia. CHF, chronic heart failure; CKD, chronic kidney disease; CPD, chronic pulmonary disease; ESA, erythropoiesis-stimulating agents; IBD, inflammatory bowel disease; ID, iron deficiency; IRIDA, iron-refractory iron deficiency anaemia; NSAIDs, Nonsteroidal anti-inflammatory drugs; PNH, paroxysmal nocturnal haemoglobinuria; PPI, proton-pump inhibitors.

Clinical implications of iron deficiency anaemia:

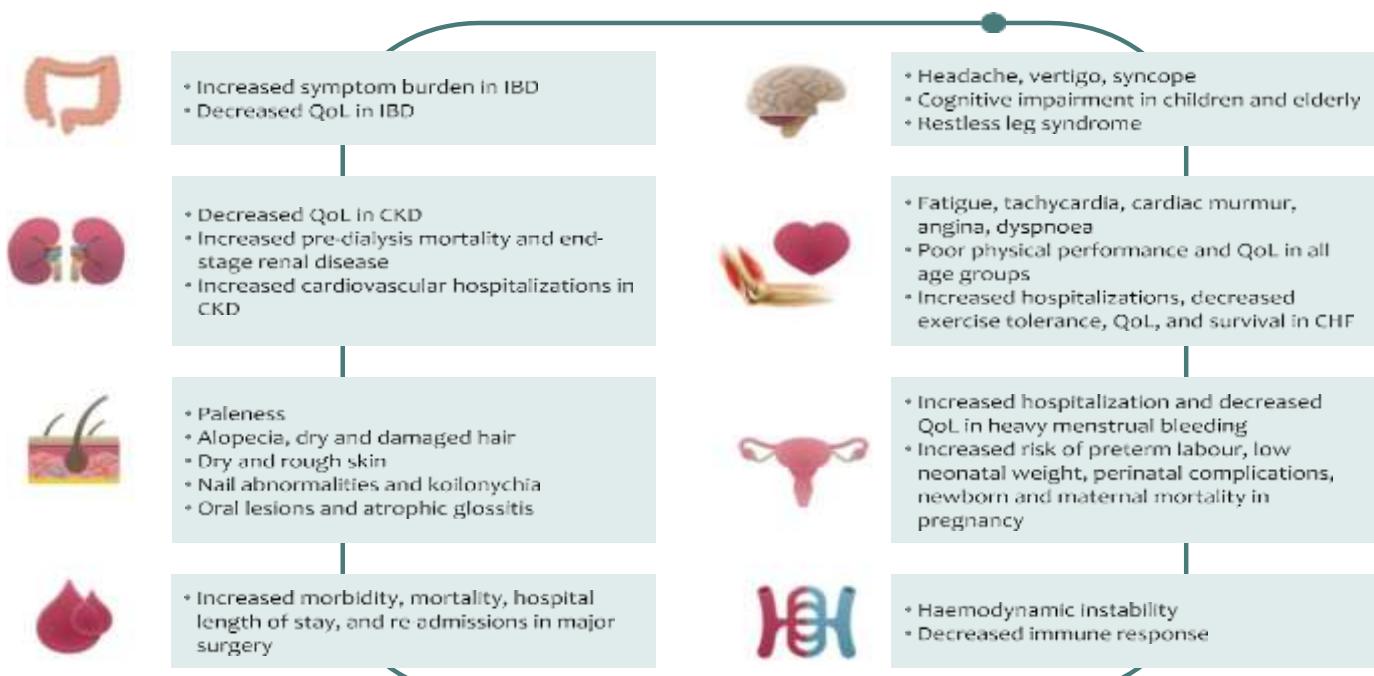


Fig. 2 Clinical implications of iron deficiency anaemia. CHF, chronic heart failure; CKD, chronic kidney disease; IBD, inflammatory bowel disease; QoL, quality of life.



Management:

Food-based approaches:

Dietary improvement:

- The primary goal of dietary modification to improve and maintain the iron status of a population involves changes in behavior, leading to an increase in the selection of iron-containing foods and a meal pattern favorable to increased bioavailability. Although sometimes difficult to achieve, such changes in dietary habits can bring about important sustainable improvements, not only in iron status but also for nutrition in general. Such changes must be rooted in issues that take into account food security, actual availability, and education.
- Bioavailability of food iron is strongly influenced by enhancers and inhibitors in the diet. Presently, there is no satisfactory *in vitro* method for predicting the bioavailability of iron in a meal.
- Iron absorption can vary from 1% to 40%, depending on the mix of enhancers and inhibitors in the meal. Therefore, the adequacy - i.e. bioavailability - of iron in usual diets can be improved by altering meal patterns to flavour enhancers, lower inhibitors, or both.

Enhancers of iron absorption include:

- Haem iron, present in meat, poultry, fish, and seafood;
- Ascorbic acid or vitamin C, present in fruits, juices, potatoes and some other tubers, and other vegetables such as green leaves, cauliflower, and cabbage; and
- Some fermented or germinated food and condiments, such as sauerkraut and soy sauce (note that cooking, fermentation, or germination of food reduces the amount of phytates).

Inhibitors of iron absorption include:

- Phytates, present in cereal bran, cereal grains, high extraction flour, legumes, nuts, and seeds;
- Food with high inositolcontent;
- Iron-binding phenolic compounds (tannins);

foods that contain the most potent inhibitors resistant to the influence of enhancers include tea, coffee, cocoa, herbal infusions in general, certain spices (e.g. oregano), and some vegetables; and

- Calcium, particularly from milk and milk products.

Examples of simple but effective alterations in meal patterns that enhance iron absorption might include:

- Separate tea drinking from mealtime - one or two hours later, the tea will not inhibit iron absorption because most of the food will have left the stomach;
- Include in the meal fruit juices such as orange juice, or another source of ascorbic acid such as tubers, cabbage, carrots, or cauliflower;
- Consume milk, cheese, and other dairy products as a between-meal snack, rather than at mealtime; and
- Consume foods containing inhibitors at meals lowest in iron content, e.g. a breakfast of a low-iron cereal (bread or corn tortilla) consumed with tea or milk products; this meal pattern can provide adequate calcium without hampering iron nutrition.

Food fortification:

- There is a consensus that enrichment (or fortification) of food is an effective long-term approach to improving the iron status of populations. Once a fortification programme is established, it is a cost-effective and sustainable means of achieving this purpose.
- Essential requirements for implementing fortification strategies include the identification of an appropriate food vehicle that reaches the target population, that is centrally processed, and that is widely available and consumed in relatively predictable amounts by vulnerable population groups.
- The dietary habits of the population are an important consideration in selecting a food for fortification. For example, possible appropriate



food vehicles range from wheat flour or pasta and condiments like sugar, salt, curry powder, haldi, monosodium glutamate (MSG), to bouillon cubes and soy sauce.

Fortified foods for young children:

- Normal-birth-weight infants who are exclusively breastfed do not need iron supplements for the first 4 to 6 months of life. When complementary feeding begins, and certainly after 6 months of age, infants need an additional source of iron to maintain adequate iron nutrition and prevent iron deficiency anaemia.
- Since cereals are widely used as early complementary foods, they should be fortified during their commercial preparation, by extrusion, cooking, or mixing processes. Centrally processed milk-based foods designed for infants and preschool children should also be fortified. Other forms of iron have been used for infant cereals: small-particle-size metallic iron is the form most widely used.

- An iron complex with ammonium-orthophosphate - which is less reactive and has better absorbability - is used successfully in Sweden, and its use should be explored elsewhere. Iron pyrophosphate and orthophosphate should not be used, because of their poor bioavailability.
- Finally, the practice of including iron-rich complementary foods for young children should be encouraged, both at home and in the community. Ferrous sulphate is the most widely used fortificants for cows' milk or modified infant formula.

Iron supplementation:

The National Nutritional Anaemia Prophylaxis Programme initiated in 1970, was revised and expanded to include beneficiaries from all age groups namely children aged 6-59 months, 5-10 yr, adolescents aged 10-19 yr, pregnant and lactating women and women in reproductive age group under the **National Iron plus Initiative (NIPI) programme in 2011**.

Table 2. Dose and frequency of iron for the prevention of anaemia under National Iron Plus Initiative (NIPI) programme and their comparison with global guidelines

Parameters	NIPI, 2013	Global guidelines (WHO) 2016
Infants aged 6-23 months		
Dose of iron	20 mg elemental iron and 100 µg folic acid	10-12.5 mg elemental iron/kg*
Frequency	Biweekly	Daily*
Duration	Throughout the year	3 consecutive months (90 days) in a year*
Children aged 24-59 months		
Dose of iron	20 mg elemental iron and 100 µg folic acid	30 mg elemental iron*
Frequency	Biweekly	Daily*
Duration	Throughout the year	3 consecutive months (90 days) in a year*
Children aged 5-10 yr		
Dose of iron	45 mg elemental iron and 400 µg folic acid	30-60 mg elemental iron*
Frequency	Weekly	Daily*
Duration	Throughout the year	3 consecutive months (90 days) in a year*
Children aged 10-12 yr		
Dose of iron	100 mg elemental iron and 500 µg folic acid	30-60 mg elemental iron*
Frequency	Weekly	Daily*



Duration	Throughout the year	3 consecutive months in a year*
Adolescents aged 12-19 yr		
Dose of iron	100 mg elemental iron and 500 µg folic acid	30-60 mg elemental iron*
Frequency	Weekly	Daily*
Duration	Throughout the year	3 consecutive months (90 days) in a year*
Pregnant women		
Dose of iron	100 mg elemental iron and 500 µg folic acid	30-60 mg of elemental iron and 400 µg of folic acid*
		Dose of 60 mg should be given when the prevalence of anaemia is ≥40%*
Frequency	Daily	Daily*
Duration	To be started after the first trimester, at 14-16 wk of gestation for 100 days	Throughout the pregnancy*
Lactating women		
Dose of iron	100 mg elemental iron and 500 µg folic acid	30-60 mg of elemental iron and 400 µg of folic acid*
Frequency	Daily	Daily*
Duration	100 days postpartum	6-12 wk postpartum*
Women of reproduction age group		
Dose of iron	100 mg elemental iron and 500 µg folic acid	30-60 mg of elemental iron and 400 µg of folic acid*
Frequency	Weekly	Daily*
Duration	Throughout the year	3 consecutive months (90 days)*

*Indicates variation in NIPI and global guidelines of iron supplementation. Ministry of Health & Family Welfare. Guidelines for control of iron deficiency anaemia. National Iron Plus Initiative. New Delhi: MoHFW, Government of India; 2013. Available from: <http://nhm.gov.in/images/pdf/programmes/wifs/guidelines/Guidelines for Control of Iron Deficiency Anaemia.pdf>, accessed on September 19, 2021.

Table 3. Dose and frequency of iron for the treatment of anaemia amongst children and adolescents under National Iron Plus Initiative (NIPI) programme

Hb level (g/dl)	NIPI, 2013
Children aged 6-59 months	
Mild anaemia (10-10.9)	3 mg of iron/kg/day for two months
Moderate anaemia (7-9.9)	3 mg of iron/kg/day for two months
Severe anaemia (<7)	Refer urgently to DH/FRU
Children aged 5-10 yr	
Mild anaemia (11-11.4)	3 mg of iron/kg/day for two months
Moderate anaemia (8-10.9)	3 mg of iron/kg/day for two months
Severe anaemia (<8)	Refer urgently to DH/FRU
Adolescents aged 10-19 yr	
Mild anaemia (11-11.9)	60 mg of elemental iron daily for three months
Moderate anaemia (8-10.9)	60 mg of elemental iron daily for three months
Severe anaemia (<8)	Refer urgently to DH/FRU

Source: Ministry of Health & Family Welfare. Guidelines for control of iron deficiency anaemia. National Iron Plus Initiative. New Delhi: MoHFW, Government of India; 2013. Available from: <http://nhm.gov.in/images/pdf/programmes/wifs/guidelines/Guidelines for Control of Iron Deficiency Anaemia.pdf>, accessed on September 19, 2021.



Table 4. Dose and frequency of iron for the treatment of anemia for pregnant women under National Iron Plus Initiative (NIPI) programme and their comparison with global guidelines

Hb level (g/dl)	NIPI, 2013* (same for lactating women)	Global guidelines (WHO) 2016
9-11*	Dose of iron: 200 IFA tablets (1 in the morning and 1 in the evening) Frequency: Daily Duration: At least 100 days	If pregnant woman found to be anaemic* Dose of iron: 120 mg elemental iron and 400 µg folic acid Frequency: Daily Duration: Until Hb level rises to normal (Hb 11 g/dl or higher)
8-9*	Dose of iron: 200 IFA tablets (1 in the morning and 1 in the evening) Frequency: Daily Duration: At least 100 days	
7-8*	If pregnant woman found to be anaemic* Injectable IM iron preparations (parenteral iron) should be given if iron deficiency is found to be the cause of anaemia IM - Test dose of 0.5 ml given deep IM and woman observed for one hour. Iron dextran or iron sorbitol citrate complex given as 100 mg (2 ml) deep IM in gluteal region daily. Recommended dose is 1500-2000 mg (IM in divided doses) depending on the body weight and Hb level	
5-7*	Continue parenteral iron therapy as for Hb level between 7 and 8 g/dl	
<5*	Immediate hospitalization irrespective of the period of gestation in hospitals	

*Indicates variation in NIPI and global guidelines of iron supplementation. IM, intramuscular; Hb, haemoglobin; IFA, iron and folic acid.

Source: Ministry of Health & Family Welfare. Guidelines for control of iron deficiency anaemia. National Iron Plus Initiative. New Delhi: MoHFW, Government of India; 2013. Available from: <http://nhm.gov.in/images/pdf/programmes/wifs/guidelines/Guidelines%20for%20Control%20of%20Iron%20Deficiency%20Anaemia.pdf>, accessed on September 19, 2021.



OXIDATION OF PRODUCT

CHOLESTEROL



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Cholesterol ($C_{27}H_{46}O$) is one of the main sterols found in animal tissues and the high molecular weight alcohol sterols are the major components of the unsaponifiable fraction of oils and fats. Cholesterol can appear in the

free form, combined with long-chain fatty acids or as cholesterol esters, making it an essential structural component of membranes and plasma lipoproteins, modulating their fluidity, as well as being a precursor in the synthesis of steroid hormones, acid, and vitamin D. (Harper and Jacobson 1999; Miyoshi and others 2014; Morzycki 2014).

Cholesterol oxidation products or cholesterol oxides are part of a group of sterols with a structure similar to cholesterol (cholest-5-en-3 β -ol); however, they contain an additional hydroxyl, ketone or epoxide group in the sterol nucleus or a hydroxyl group found on a side chain of the molecule. The formation of cholesterol oxides is system dependent; that is the products originated as well as their relative concentrations vary depending on temperature, oxidation time, presence of water, pH, type of buffer and form of substrate (Kim and Nawar 1993).

In food, cholesterol oxides are formed by nonenzymatic oxidation or autoxidation processes and as the cholesterol is an unsaturated lipid, autoxidation takes place through a complex chain of

reactions based on the development of free radicals (Smith 1987). Room temperature, light, and the presence of oxygen are the critical factors in the degradation processes (Otaegui-Arrazola and others 2010).

Oxidation of Product Cholesterol

Salted and dried fish-

Salt-dried and dried fish preparations require several steps: cooking in brine (1 part salt and approximately 3 parts of fish), draining of the brine, and subsequent drying. These steps can induce cholesterol oxidation. After salting, the direct exposure to light and the surface of the food being in contact with oxygen for long periods are both pro-oxidant factors (Soto-Rodríguez and others 2008). Thus, numerous studies have been conducted to determine the formation of COPs in salted and dried fish. The salted and dried, and the cooked and dried products showed relatively high levels of COPs. The boiled and dried shrimp samples had levels of 8.3 $\mu\text{g/g}$ and the boiled and dried anchovies had levels of 188.0 $\mu\text{g/g}$, although the smoked samples had an average of 26.8 $\mu\text{g/g}$. Mechanism of cholesterol oxidation in processed fish using different model systems: triolein, cholesterol, and cod liver oil, all of which were stored separately at 25 °C, in dry air, for 104 d. The researchers observed an increase in the formation of COPs as well as a decrease in the concentrations of the polyunsaturated fatty acids present in these systems, suggesting that the oxidation of cholesterol in processed and storage fish takes place together with the oxidative degradation of the PUFAs of fish lipids.

Fish are not usually eaten raw, but are subjected to different forms of heat treatment. The different heating methods are a key factor in the



cholesterol oxidation process. Greater quantities of COPs are formed when the food is subjected to direct heat (Morgan and Armstrong 1992). High temperatures produce large quantities of free radicals due to the acceleration of propagation reactions and the decomposition of lipid hydroperoxides (Otaegui-Arrazola and others 2010). During storage, lipid oxidation in fish results in reduced PUFA levels, increasing the concentration of COPs (Saldanha and Bragagnolo 2008).

Milk and milk Products

Cholesterol is rich in animal food products like milk and milk products. Cholesterol accounts for 0.25-0.40% of the total lipids in milk (Jenness and Patton 1959). In milk, it is present in the fat globule membrane (FGM), in the fat core and in association with milk protein particularly in skimmed milk (Schlimme and Kiel 1989). Any process disrupting the membrane structure will result in the transfer of

cholesterol along with ruptured membrane material to the aqueous phase. The cholesterol content of ghee with the highest content in winter and lowest in summer. 80-90% cholesterol initially present in cream passed into butter and 10-20% to buttermilk (Vyshemirskii *et al.* (1977)

Removal of cholesterol in these Products

Physical, chemical, biological and complexation processes. Biochemists, food chemists, food engineers, processing technologists and food industry, must be prepared to develop and implement new technologies to inhibit /or minimize cholesterol oxidation formation.



STARVATION IN EMERGENCY ARISING OUT OF LOCUST



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intake, which further leads to starvation and eventually to death. Locust infestation is one of the emergencies which act as a contributory factor of starvation. As the production of crops are reduced. Scarcity of food supply leads to the inadequate dietary intake which in turn results in malnutrition. There are various agencies for controlling the locust infestation. Locusts are controlled through baiting, dusting, spraying and bio-pesticide.

Starvation:

Starvation may be due to lack of food intake or due to the fact that though food is taken, it cannot be utilized. In starvation, the body tries to call upon the reserves in order to survive. It tries its best to safeguard against brain death. There is a severe deficiency of caloric energy, nutrient, and vitamin intake.

Starvation arises due to lack of food intake or due to the fact that though food is taken, it cannot be utilized. The accessibility of the food is reduced hence, there is inadequate food

to starvation and

It is the most extreme form of malnutrition. According to the World Health Organization, hunger is the single gravest threat to the world's public health. The WHO also states that malnutrition is by far the biggest contributor to child mortality, present in half of all cases. Under nutrition is a contributory factor in the death of 3.1 million children under five every year.

Global Hunger Index:

The **Global Hunger Index (GHI)** is a tool that measures and tracks hunger globally as well as by region and by country. The GHI is calculated annually, and its results appear in a report issued in October each year. The 2019 Global Hunger Index report presents a multi-dimensional measure of national, regional, and global hunger by assigning a numerical score based on several aspects of hunger.

It then ranks countries by GHI score and compares current scores with past results. After declining since 2000, hunger at the global level lies on the cusp between moderate and serious, according to the 2019 report. Many individual countries have also achieved reductions in hunger since 2000, but in some countries hunger



persists or has even worsened.

Global Hunger Index Score:

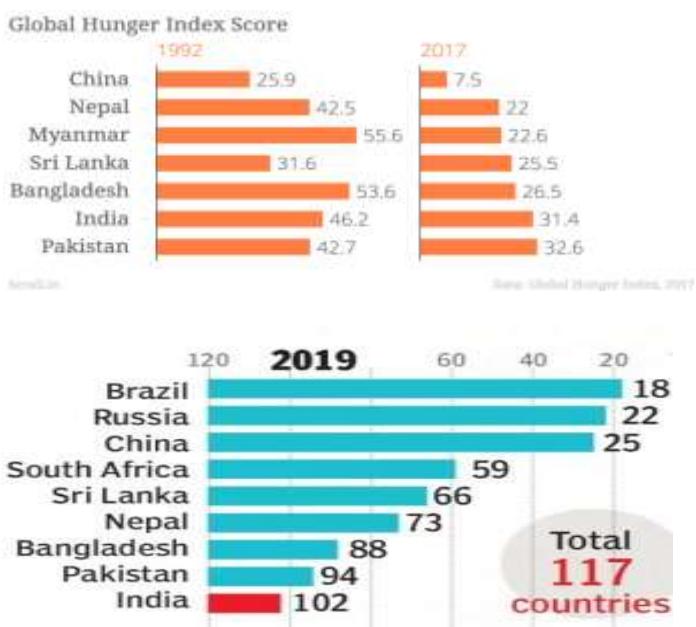
In the 2019 **Global Hunger Index**, **India** ranks 102nd out of 117 qualifying countries. With a **score** of 30.3, **India** suffers from a level of **hunger** that is serious.

Emergency:

Situation that poses an immediate risk to health, life, property and environment. Most emergencies require urgent intervention to prevent a worsening of the situation, although in some



situations, mitigation may not be possible and agencies may only be able to offer palliative care for the aftermath.



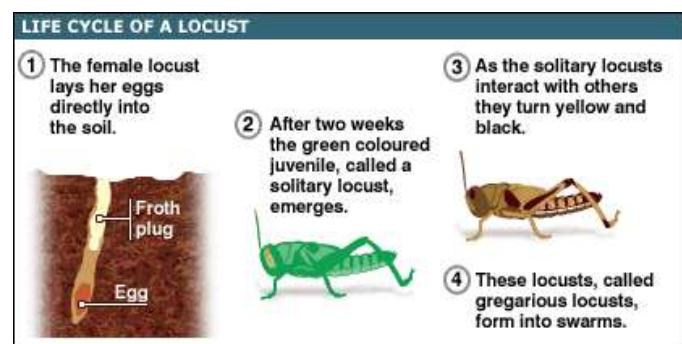
Diseases in Emergencies:

1. Food Borne Diseases
2. Water Borne Diseases
3. Air Borne Diseases
4. Diseases Due To Nutrient Deficiencies
 - o Protein-Energy Malnutrition (PEM)
 - ✓ Marasmus
 - ✓ Kwashiorkor
 - ✓ Marasmic Kwashiorkor
 - o Micronutrient Deficiencies
 - ✓ Iodine deficiency
 - ✓ Iron deficiency
 - ✓ Vitamin A deficiency

Locust:

Locusts are the swarming phase of certain species of short-horned grasshoppers belonging to

the family Acrididae. These species can breed rapidly under suitable conditions and subsequently become gregarious and migratory when their populations become dense enough. All species of locust undergo three main life stages: egg, nymph and adult locust. Though all locusts go through the phases, the amount of time spent in each stage varies according to the specific species of locust.



Both the bands and the swarms are nomadic and rapidly strip fields and greatly damage crops. The adults are powerful fliers; they can travel great distances, consuming practically all green material wherever the swarm settles. Desert locusts can measure roughly 75 millimeters (3.0 inch) in length. Though the female and the male look alike, they can be distinguished by looking at the end of their abdomens.

Jewish dietary laws, which prohibit the consumption of other insects, allow locusts and crickets to be eaten. Locusts can produce 1 kg of protein from 2 kg of fodder, compared to a cow needing 10 kg of fodder to produce the same amount of protein. Locusts can consume the approximate equivalent of their body mass each day. They can eat leaves, flowers, bark, stems, fruit, and seeds.

Nearly all crops, and non-crop plants, are at risk, including pearl millet, rice, maize, sorghum, sugarcane, barley, cotton, fruit trees, date palm, vegetables, rangeland grasses, acacia, pines, and banana. Locust droppings are toxic, and spoil any stored food that is left uneaten.

Locust Infestation in World:

- 1915 locust plague



- 2004 locust outbreak
- Large swarms of locusts travelled through New South Wales, south west Queensland and the northern parts of Victoria and South Australia earlier in the year of 2010.
- 2013 Madagascar locust plague
- Locust infestation in 2020 at Somalia, Kenya, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, South Sudan, Sudan, Uganda, Yemen, India, Pakistan, Iran, Nepal.

Locust Infestation in 2020:

- The 2019–20 locust infestation in Africa, the Arabian Peninsula, South Asia and South America is an outbreak of desert locusts which is threatening the food supply across the region.
- The outbreak is the worst in 70 years in Kenya and the worst in 25 years in Ethiopia, Somalia and India.
- The plague began in June 2019 and has continued through 2020.
- The current outbreak began when Cyclone Mekunu in 2018 produced heavy rains in the Rub' al Khali of the Arabian Peninsula; in Spring 2019, swarms spread from these areas, and by June 2019, the locusts spread north to Iran, Pakistan, and India and south to East Africa, particularly the Horn of Africa.
- The global upsurge of locusts is on the brink of becoming a plague, aided by unusually favourable weather for three years and the international community's failure to curb their growth.
- Swarms of locusts took Delhi and the National Capital Region by surprise on June 27, 2020, the first time since the locust plague of 1926-31, according to some estimates.
- After spreading to Bihar, the insects have started mayhem in Nepal. By July 2, locusts spread to almost a dozen districts in the Himalayan country where the kharif crop cycle is underway.
- Locusts have damaged transplanted paddy, maize, fodder grass and vegetables, according to

Plant Quarantine and Pesticide Management Center in Nepal's Lalitpur. Severe damage has been reported from Dang and Pyuthan districts.

- While some swarms have stayed in the Kathmandu valley, some have headed further north towards Ramechaap.
- In the past, locusts have invaded Nepal on rare occasions and only during plagues.
- By the end of 2019, there were swarms in Ethiopia, Eritrea, Somalia, Kenya, Saudi Arabia, Yemen, Egypt, Oman, Iran, India, and Pakistan. By June 2020, another swarm appeared in South America, affecting Paraguay and Argentina.
- As of April 2020, efforts to control the locusts are being hampered by ongoing restrictions in travel and shipping due to the COVID-19 pandemic, contributing to the global coronavirus food crisis.

Desert Locust Situation:

- Desert Locust swarms continue to persist in several countries in the Horn of Africa as well as in **Yemen**. Summer breeding is in progress along both sides of the **Indo-Pakistan** border.
- In **Ethiopia**, immature swarms are present in the Somali region near Dire Dawa and **Djibouti**, in the western Ogaden, and within a large area of freshly green vegetation in northern Rift Valley of Afar region. On 7 August, an immature swarm from northwest **Kenya** appear in the southern Rift Valley of SNNPR. Ground and aerial control operations are in progress.
- In **Somalia**, immature swarms persist in the northwest while additional immature swarms appeared in the northeast, and low numbers of adults are present in the central region of Galguduud. Ground and aerial control operations using biopesticides continue.
- In **Kenya**, a few spring-bred swarms persist in parts of Turkana and Samburu counties in the north where aerial control operations continue.
- In **South Sudan**, at least one immature swarm from northwest **Kenya** arrived in the southeast



near Kapoeta on 2 August and was seen moving northwards during the next few days. Ground control operations were undertaken.

- In **Sudan**, there have been no reports of swarms arriving from northwest **Kenya**. So far, only low numbers of scattered adults are present in the summer breeding areas where annual vegetation has become green and conditions are favorable for breeding both by local populations as well as by any swarms that might appear.
- In **Yemen**, breeding continues in areas of recent rains in the interior and hopper bands are forming. Swarms are also present in the interior and, on 4 August, a swarm arrived on the northern Red Sea coast.
- In **Oman**, late instar hopper group and bands are present on the southern coast near Salalah where immature adult groups are forming there as well as further north near Ras Al Hadd. Control operations are in progress.
- In **Pakistan**, control operations continue against hopper groups and bands in southeast Sindh near Nagarparkar and the **India** border. Low numbers of adults are present in Cholistan and Lasbela where breeding will occur.
- In **India**, only a few spring-breed adult groups and swarms remain in northern Rajasthan as most of the first-generation laying has finished. As a result, widespread hatching and the formation of hopper groups and bands is underway. Control operations continue.
- In **West Africa**, scattered solitarious adults are present in the summer breeding areas in southern Mauritania, central and northern **Niger**, and in western and eastern **Chad**. Annual vegetation has become green in these areas and conditions are favourable for breeding that is likely to already be in progress.

Locust Controlling Agencies in India:

- The “*Locust Control and Research*“ is one of the divisions of the Directorate of Plant Protection, Quarantine and Storage, being implemented through an Organization known as Locust Warning Organization (LWO) established in 1939, to monitor, forewarn and control of Desert Locust (an international pest).
- The **Locust Warning Organization** (LWO) monitors locust development/ activities over an area of 2.00 lakh sq km of the Scheduled Desert Area (SDA) in parts of Rajasthan, Gujarat and Haryana States. It strengthens the locust monitoring and forecasting.
- A Remote Sensing Laboratory has also been set up to prepare vegetation maps based on satellite imageries for locust forecasting.
- It maintains its own wireless network for exchanging information on locust surveys and control. Wireless communication between Jodhpur (India) and Karachi (Pakistan) is also maintained every year during June to November for exchanging locust intelligence (between the two countries).

Australian Plague Locust Commission (APLC):

- The Australian Plague Locust Commission undertakes monitoring of locust populations in inland eastern Australia and manages outbreaks that have the potential to inflict significant damage to agriculture in more than one-member state as a result of population build-up and migration.
- The APC is jointly funded by the Australian Government and the member states of New South Wales, Victoria, South Australia and Queensland.



FARMING SYSTEM FOR NUTRITION



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prices, This can be achieved by integrating agriculture, nutrition and health so that people can leave with dignity. Dr. M S Swaminathan gaaru briefly about the steps to be taken for giving equal priority to food items and priority of nutritional security, in his speech from Food security to Nutrition on Food Agriculture Institute (FSO) and by him Global Effects on Food Productions also discusses the shift from food security to the change in priority has been strongly emphasized. Nutritional security means physically, economically and socially balanced diet, access to clean drinking water, sanitation and primary health care. After 30 years, the issue of nutritional security has become a priority. Dr. M S Swaminathan Research Foundation, Chennai wants to demonstrate that agriculture, health and nutrition are inextricably linked, Availability, protein deficiency, iron, zinc, iodine, vitamin-A think about micronutrients such as

Achieving food security from 1947 in our country is the main goal. Nutritional security was specially introduced in the Food Safety Act 2013. Food security in the order of human life, providing nutritional security, providing adequate quantity of quality food to the people at affordable

deficiency, the Farming System for Nutrition for nutrition developed by Dr. M S Swaminathan. Above all, to nurture the genetic potential of biologically rich plants and create a worldwide grid to nurture hidden hunger. Some districts are identified with malnutrition include Thane district in Maharashtra, Gorakhpur in Uttar Pradesh, Karafuto in Odisha and some places of Tamil Nadu, demonstrations on nutrient based farming systems were conducted and good results were obtained. Acharya N.G. Ranga Agricultural University for organizing their exhibitions in Andhra Pradesh for the year 2019, Farming System for Nutrition launched at Krishi Vigyan Kendra, Rastkuntubai which is located in tribal area.

OBJECTIVES

1. To encourage small and marginal farmers for implementing mixed farming in 1 acre so that they can meet the nutritional security.
2. To encourage farmers to address the problems of under nutrition and nutritional deficiencies.

Things to do in a nutritional farming system

- Cultivation of bio-enriched crops / Nutrient enriched crop varieties
- Cultivation of bio-enriched crops / Nutrient enriched crop varieties + Dairy farming
- Cultivation of bio-enriched crops / Nutrient enriched crop varieties + Horticulture / Silkworm cultivation.
- Cultivation of bio-enriched crops / Fish cultivation + Mushroom cultivation
- Cultivation of bio-enriched crops Poultry farming + Sheep farming

Along with these, nutritious backyard gardening needs to be done, especially growing backyard vegetable plants, vines and tuber plants, greens, fruit plants, medicinal plants like curry leaf, lemon, mango etc,. Essentially the plant varieties are selected and displayed in Krishi Vigyan Kendra in a way that corrects the nutritional deficiencies, to



show and create awareness to the farmers, farm women and students who have visited KVK and to conduct awareness training programmes on farming system for nutrition. All these procedures are also performed on the 1 acre farm, which is especially useful for small and marginal farmers.

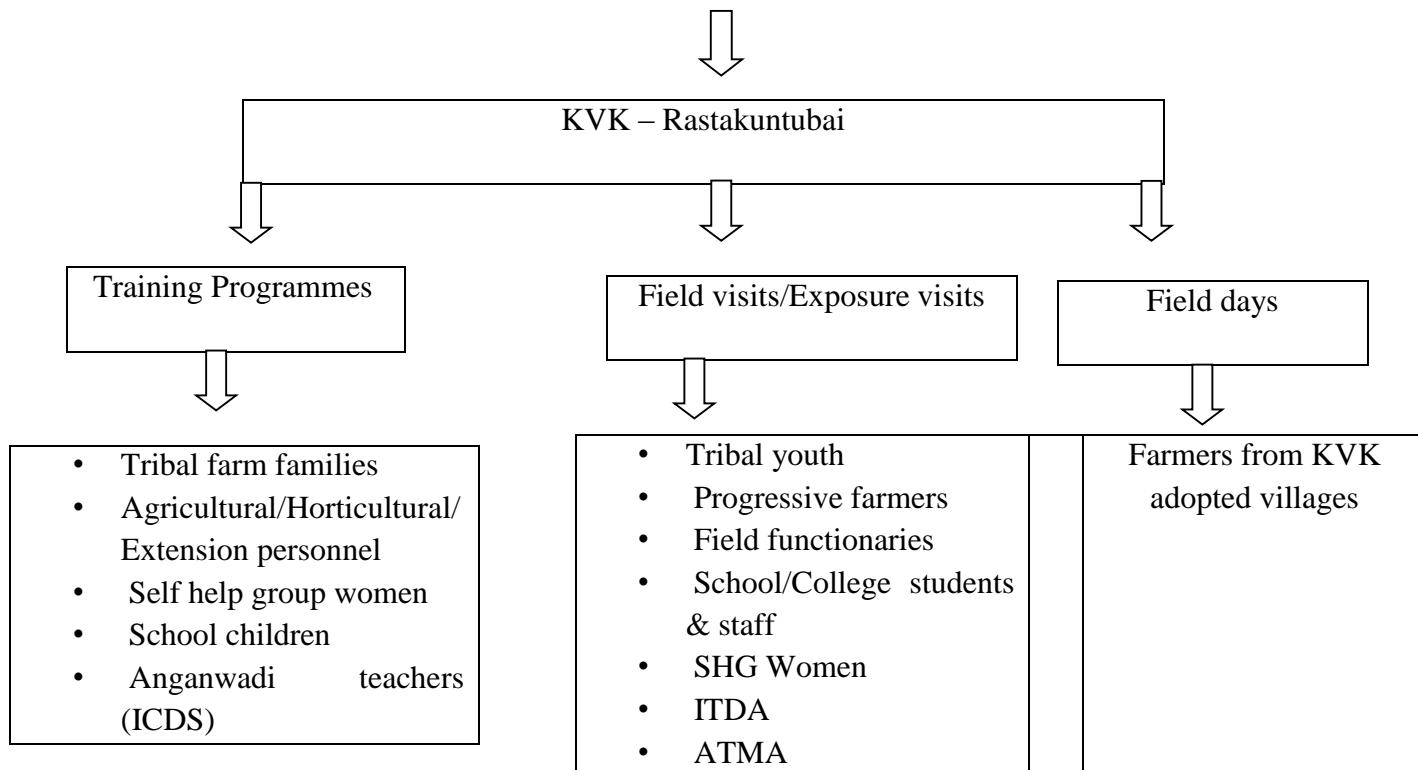
- Malnutrition can be overcome by cultivating and consuming grains, especially pulses and small grains.
- Suitable for consumption of poultry, sheep, milk and milk products for quality protein.
- Growing nutritious backyard gardens as an address to correct micronutrient deficiencies can contribute to their utilization.

Dissemination activities

1. Organized nutrition education programmes to the farmers/women/school children.

2. Oriented tribal families and youth about FSN concept and motivated to implement the plan one acre next season.
3. Created awareness to the farmers on biofortified and nutri dense varieties suitable for tribal area as part of the KVK capacity building activities,
4. Developed education material in local language to emphasize FSN concept and displayed the posters KVK adopted villages, distributed to anganwadies and schools.
5. Organized field visits to the FSN demo plot at KVK and explained farmers and students and extension personnel about the importance.
6. Organized field days in the critical stages of the crops like vegetative stage and harvesting stage.

MSSRF – Farming System for Nutrition



Farmer's feedback

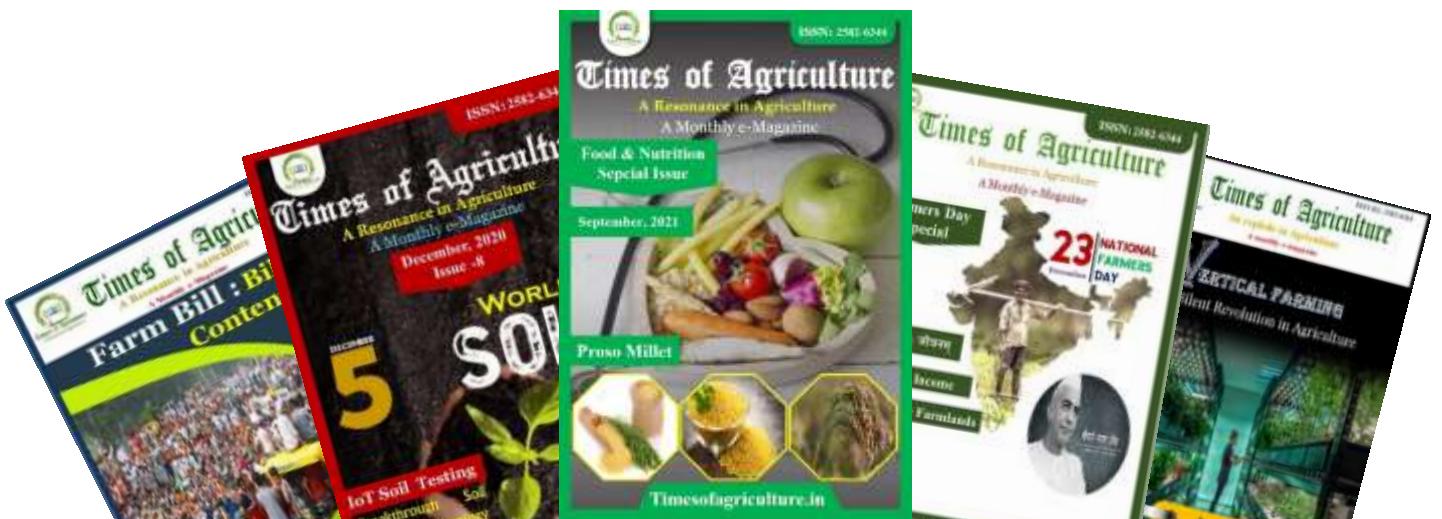
1. Farmers are interested in FSN model due to improves their health status.
2. Regular availability of leafy vegetables, vegetables and fruits like papaya made rich health diversity in home stead.
3. Farmers are happy in receiving cereals, pulses, oilseeds, getting food security for their home stead and also meet in nutritional security with vegetables.

Challenges

- Utilization of underutilized nutri dense vegetables and fruits locally available
- Nutritional inhibitors and bio availability
- Preservation techniques for yearlong consumption of nutri rich fruits and vegetables
- Value addition to the produce

- Awareness about better cooking methods for maximum nutrient retention
- Nutrition and its impact on child's physical and cognitive growth and development
- Awareness about food fads and fallacies /myths
- Educating about reading and understanding Nutri labels on RTE / RTS foods
- Low cost nutri rich weaning foods for children
- Nutritional status of the tribal families before and after consumption of bio fortified crops can be studied for up scaling of the FSN model
- Bio fortified fodder crops can be incorporated in the model to enrich animal protein component. By doing this, farmers can get good nutrition, good health, happiness and high income.





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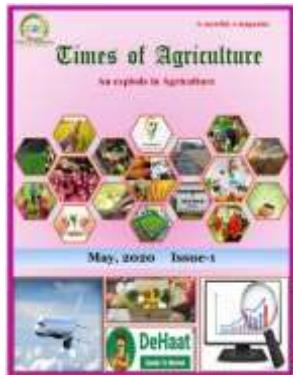
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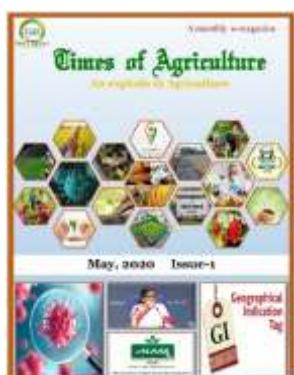
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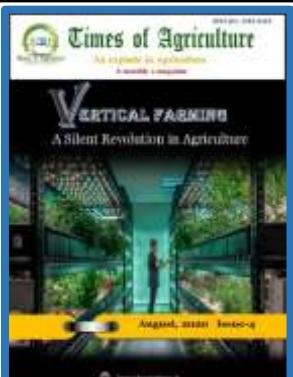
1-May



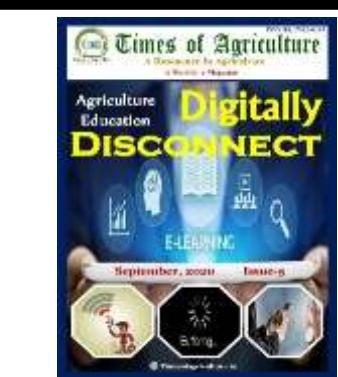
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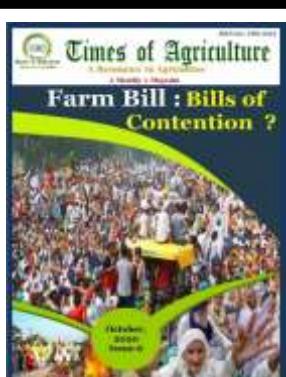
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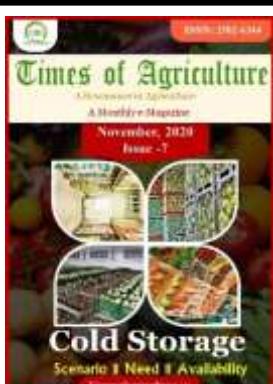
4-August



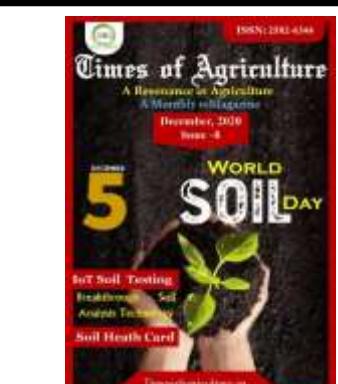
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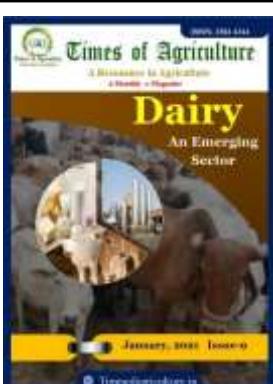
6-October



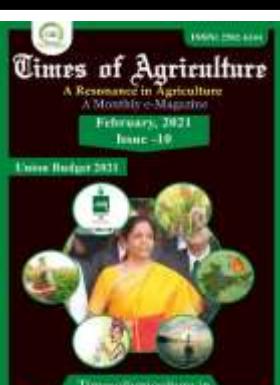
7-November



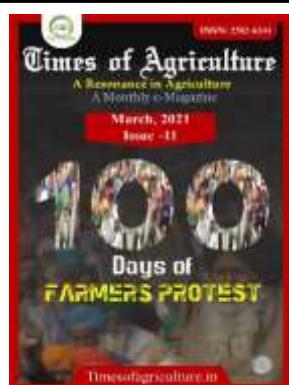
8-December



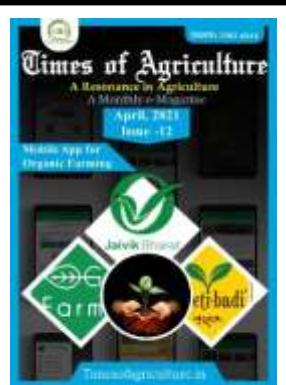
9-January



10-February



11-March



12-April