

COARSE CEREALS –RICH SOURCE OF NUTRACEUTICALS

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ABSTRACT

Increasing awareness about health conscious and nutritional benefits leads to know the concept of nutraceutical and functional food. Among the food crops, coarse cereals are dominated as nature's nutraceutical as compared to other cereals crop. Coarse cereals are the most important source of food and have a significant role in the human diet. They provide rich sources of minerals like iron, calcium, zinc, magnesium, phosphorous and potassium. While there has been dramatic improvement in the area and production of rice and wheat, quite the reverse trend has been noticeable in case of acreage cultivation of coarse cereals production because of change in food culture. Growth is the necessary condition for the success of a crop in any region. The coarse cereals are rain-fed crops and directly contribute more than half of all calories consumed by human beings. Among the cereals, all the coarse cereals are considered as a poor man's food and it has less demand in domestic side because of change in food pattern. But this is the main reason for malnutrition. So the study examines with a view to investigate the nutritional benefits and performance of coarse cereals production in Tamil Nadu with the help of simple average method and compound growth rate analysis during the last five decades (1965-66 to 2014-15).

Key words: Nutraceutical, Coarse cereals, Malnutrition.

INTRODUCTION

Increasing awareness about health conscious and nutritional benefits leads to know the concept of nutraceutical and functional food. These concepts were developed because of increasing healthcare costs, changes in food laws affecting label and product claims, an aging population and rising interest in attaining wellness through diet, among others. Nutraceuticals are "naturally derived bioactive compounds that are found in foods, dietary supplements and herbal products, and have health promoting, disease preventing, or medicinal products" (Ref: Nutraceuticals Institute). Functional foods are foods which contain an ingredient that gives that food health-promoting property over and above its usual nutritional value, for example, probiotic yoghurts. Many of the traditional foods are being a nature's nutraceuticals, but they are not in food pattern due to dietary supplements. Among the food crops, coarse cereals are one of the oldest foods known to humans. A regular consumption of coarse cereals can help to overcome malnutrition among majority of our population. These have often been called the coarse grains; however, due to their nutritional contributions, these are now being referred

as 'nutria-millet/nutria-cereals'. This paper studies the nutraceutical aspects of coarse cereals and their beneficial aspects to improve the health, to prevent and reduce the risk factors for several diseases were also reviewed.

OBJECTIVES

The following objectives were analysed in this paper,

1. To know the concept of nutraceutical and functional food.
2. To assess the nutrition value of coarse cereals crop.
3. To analyse the performance of coarse cereals in Tamil Nadu state with the help of compound growth rate analyses.
4. To review the nutraceutical use of coarse cereals crop.

NUTRACEUTICALS AND FUNCTIONAL FOOD

Nutraceutical" was coined from "nutrition" and "pharmaceutical" in 1989 by Stephen Defelice, MD, founder and chairman of the Foundation for Innovation in Medicine (FIM), Cranford, NJ. According to him, nutraceutical can be defined as, "a food that provides medical or health benefits, including the prevention and/or treatment of a disease." [Brower V., 1998]. Today, Nutraceutical in market consist of both traditional food and non traditional food. In traditional food, consist of natural, whole foods with new information about their potential health qualities, no change to actual foods. Examples of these foods are lycopene in tomatoes, omega-3 fatty acids in salmon. "Functional foods," which are provide benefits beyond basic nutrition and may play a role in reducing or minimizing the risk of certain diseases and other health conditions. Examples of these foods include fruits and vegetables, whole grains, fortified foods and beverages and some dietary supplements. With the functional characteristics of many traditional foods are being out side in the food basket at present. While new food products are being developed to include beneficial components and also malnutrition are also developed. By knowing which foods can provide specific health benefits is helps to develop nutritional security.

NUTRITIONAL CONTENT OF COARSE CEREALS

Coarse cereals are the most important source of the World's food and have a significant role in the human diet throughout the World. Millets are rich sources of minerals like iron, calcium, zinc, magnesium, phosphorous and potassium. Ragi (Finger millet) is very rich in calcium; and bajra in iron. These also contain appreciable amounts of dietary fibre and various vitamins (β - Carotene, niacin, vitamin B₆ and folic acid); high amounts of lecithin are useful for strengthening the nervous system.

It is observed from the following table that protein ranges from 6 to 12 per cent and fat content from 1 to 5 per cent in coarse cereals. Protein present in coarse cereals has well balanced amino acid profile and good sources of methionine, cystine and lycine. These

essential amino acids are of special benefit to those who depend on plant food for their protein nourishment. The coarse cereals contains about 60 to 72.6 per cent of carbohydrate, a high proportion of which is in the form of non-starch polysaccharides and dietary fibre which help in prevention of constipation, lowering of blood cholesterol and slow release of glucose to the blood stream during digestion.

Table -1
NUTRITIONAL COMPOSITION OF COARSE CEREALS COMPARED TO FINE CEREALS (PER 100 G)

Crop / Nutrient	Carbo-hydrates (g)	Protein (g)	Fat (g)	Energy (g)	Fiber (g)	Minerals (g)	Calcium (mg)	P (mg)	Fe (mg)
Cholam	72.6	10.4	1.9	349	1.6	1.6	25	222	4.1
Cumbu	67.5	11.6	5.0	361	1.2	2.3	42	296	8.0
Ragi	72	7.3	1.3	328	3.6	2.7	344	283	3.9
Thinai	60.9	12.3	4.3	331	8.0	3.3	31	290	2.8
PaniVaragu	70.4	12.5	1.1	341	2.2	1.9	14	206	0.8
Varagu	65.9	8.3	1.4	309	9.0	2.6	27	188	0.5
Samai	67.0	7.7	4.7	341	7.6	1.5	17	220	9.3
Kuthiraivali	65.5	6.2	2.2	307	9.8	4.4	20	280	5.0
Rice	78.2	6.8	0.5	345	0.2	0.6	10	160	0.7
Wheat	71.2	11.8	1.5	346	1.2	1.5	41	306	5.3

Source: Nutritive value of Indian foods, MIN, 2007

Lower incidence of cardiovascular diseases, duodenal ulcer and hyperglycemia are reported among regular coarse cereals consumers. Coarse cereals are rich in important vitamins viz., Thiamine, riboflavin, folin and niacin. Comparing to rice and wheat, coarse cereals are rich in some of the minerals as well as fatty acids. It is vary largely in composition of carbohydrates as proportions of amylase and amyl pectin content vary from 16-28 percentages and 72-84 percentages respectively. It is the staple diet of millions of peasants and labourers.

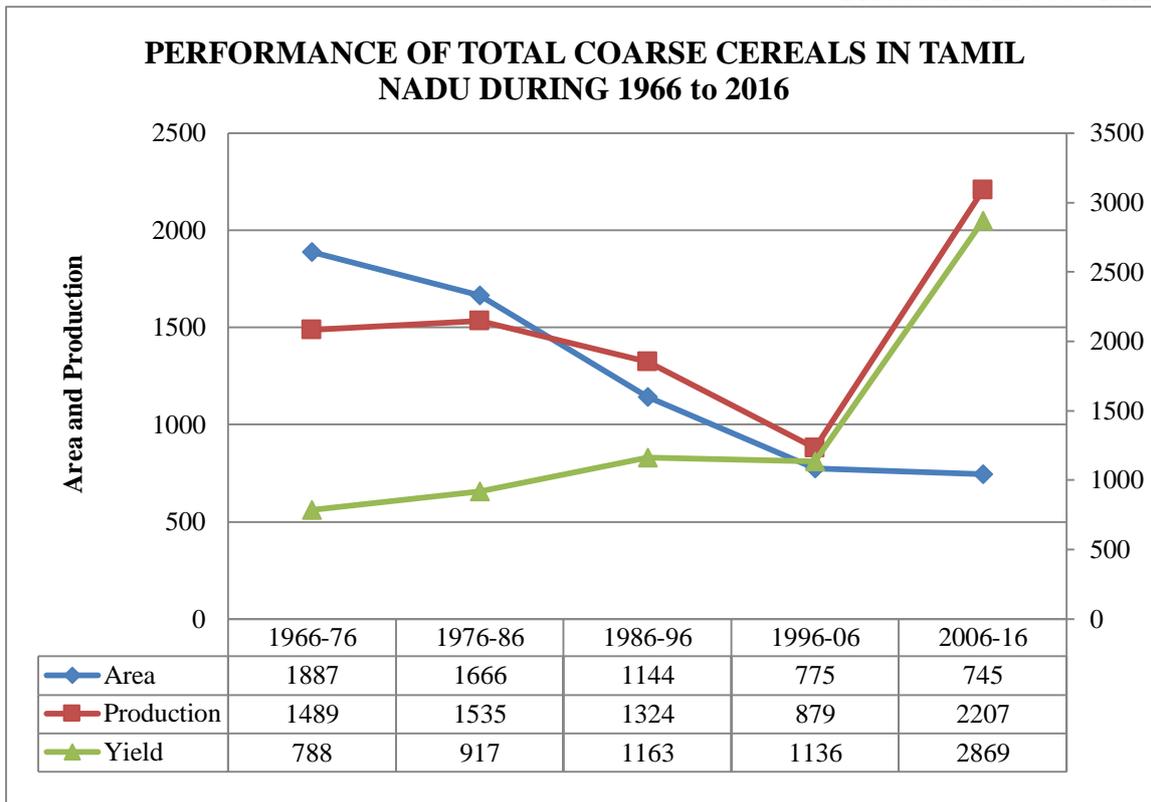
PERFORMANCE OF COARSE CEREALS IN TAMIL NADU STATE

In Tamil Nadu state, there is an existing imbalance in the cropping pattern of the food grains because a large proportion of the area under food grains is occupied by superior cereals. Coarse cereals are cultivated as dual purpose crops during both rainy and post rainy

season. It is unique that the coarse cereals plant and its produce find a wide range of uses not only in the daily life of the people but also in a way for various industrial purposes. Though coarse cereals have grown slower than superior cereals rice and wheat, their characteristics are not exactly the same. While coarse cereals have been considered as inferior goods and are relatively low value crops. The performance of area, production and productivity of coarse cereals during last decadal average is shown below.

Table - 2

Area - In 000' Hectares
Production-In 000' Tonnes



Source: Directorate of Economics and Statistics

Above chart shown that the decadal performance of coarse cereals from 1966 to 2016. The area under coarse cereals cultivation has shrunk over the last decades. During the same period, production and productivity of coarse cereals were in an increasing trend. Increasing population is the major reason for increasing demand for food stuff day by day. Food is consumed by entire population. There are various reasons for reduction of cultivable land for the production of coarse cereals such as the land are not as productivity as before, fragmented land holdings, inefficient labour, financial constraints, lack of adequate irrigation facilities, cultivation methods, inadequate use of modern inputs, consolidation of land holdings and execution of ceiling etc.

TOOLS USED

The Compound growth rate (CGR) of area, production and productivity for the coarse cereals for past decades were estimated to study the growth of area, production and productivity of coarse cereals in Tamil Nadu state by fitting the exponential trend line of the following form:

$$Y = AB^t$$

Where Y = area, production and productivity.

t = trend variable in year corresponding to the respective area, production and productivity.

A and B are constants

and $CAGR = \text{Anti}(\text{Log } b - 1) \times 100$.

The compound growth rates are found to be very convenient for any comparison of growth between two period and two crops. It seems more appreciable to analyse the movements of agricultural crops in terms of compound growth rate rather than linear growth rate.

EMPIRICAL RESULT

In the present study has based on purely time series secondary data covering the period from 1965-66 to 2015-16 for the total coarse cereals in Tamil Nadu were the collected from Department of Economics and Statistics of Tamil Nadu.

Table -3

COMPOUND GROWTH RATE OF COARSE CEREALS IN TAMIL NADU STATE DURING THE PAST DECADES

(In percentage)

State	Factors		
	Area	Production	Yield
Tamil Nadu	-2.58	0.12	2.77

Source: Compiled by the Researcher

In Tamil Nadu state, the growth rate of acreage cultivation for coarse cereals showed negative trend with -2.58 percentages and the production and yield of coarse cereals indicates positive trend with 0.12 percentage productions and 2.77 percentage yield rate. Decrease in area under coarse cereals has shifted towards the cash crops because farmers moving towards these economically more profitable options. The cultivation of other crops must be carried out as regular trend, but not on the cost of coarse cereals.

NUTRACEUTICAL FACTORS OF COARSE CEREALS

The nutraceutical qualities of a coarse cereals crop as a traditionally consumed food is analysed. In present days coarse cereals are being a nature's nutraceuticals for many health issues.

- ❖ Coarse cereals are also rich in phytochemicals (polyphenols, tannins, phytosterols) and antioxidants; however, they do contain some anti-nutritional factors that can be reduced by certain processing treatments.
- ❖ Due to their high dietary fibre content coupled with low glycaemic index, millets can help in curbing overweight/obesity as well as lowering the risk of hypertension, CVDs, T2DM, cancers as well as in preventing constipation.
- ❖ Coarse cereals are diets rich foods which are protective against several degenerative diseases.
- ❖ In addition, there is strong evidence that coarse grains cereals protect the body against age-related diseases such as diabetes, cardiovascular diseases and some cancers.
- ❖ Coarse cereals must also be accepted as functional food and nutraceuticals because they provide dietary fibers, proteins, energy, minerals, vitamins and antioxidants required for human health.
- ❖ Several potential health benefits such as preventing cancer and cardiovascular diseases are shown in coarse cereals crop.
- ❖ They also reducing tumor incidence, lowering blood pressure, risk of heart disease, cholesterol and rate of fat absorption.
- ❖ By the nutritional parameters, coarse cereals are miles ahead of rice and wheat in terms of their mineral content.

Despite numerous qualities, utilization of coarse cereals as food is confined to the traditional consumers, particularly the tribal populations. This is mainly due to the non-availability of consumer friendly and preparation process of coarse cereals based products. Recently, coarse cereals have gained attention as nutri-cereals and efforts are under way to obtain their convenient and value added processed products.

ENHANCING COARSE CEREALS AS FUNCTIONAL FOOD

In spite of the extraordinary nutritional qualities of coarse cereals and capacities of coarse cereals farming systems, the area under coarse cereals production has been shrinking over the last five decades. From the above study, it is evident that

- Coarse cereals are superior in some of the nutritional components compared to most widely consumed rice and wheat.
- These coarse cereals contributes towards balanced diet, and can hence ensure nutritional security more easily through regular consumption has resulted in

reduced availability of these nutritious grains to needy population and also the traditional consumers have gradually switched over to more easily available fine cereals due to the government policies. This is a disturbing trend and needs urgent focus by the agricultural experts and policy makers.

- Immediate policy and market support, value addition and promotional activity are necessary for arresting the further decline not only in cultivation but also consumption.
- Improving productivity and enhancing demand should be the twin approaches.
- Development of healthy foods and their commercialization should receive focused attention to promote the coarse cereals among the urban elite, which would lead to reduction in life-style related disorders.

CONCLUSION

As the nutraceutical aspects of coarse cereals, our farmers should aim at growing more and more of the coarse cereals and also people should include coarse cereals in daily food basket. Apart from increasing the production and consumption, in today's era of modernization, industrialization and urbanization, people need to adequately process the coarse cereals to create a variety of value added nutritious products as per the taste, texture, flavour of the consumers. Further, the public need to be made aware of the benefits conferred by coarse cereals and their role in combating the ill effects of westernized sedentary lifestyle so that they can lead a healthy life.

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