

MARKET NARRATIVE SERIES

NUTRITIONAL BENEFITS OF NATURALLY GROWN FOOD PRODUCTS

Discussion Paper 1



**NATIONAL COALITION
FOR
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Preface

The nationwide scaling of Natural Farming will be a reality once the average consumer feels the need to switch to food grown with agroecology based practices and demands for it.

The demand for organic (one of the methods of Natural Farming) food is growing steadily; however, its appeal has been limited to a niche of high-income households and highly health-conscious consumers. Lack of information and awareness of natural farming's benefits has been a critical factor in consumer adoption and committed support from policymakers, researchers, and donors in the ecosystem.

The National Coalition for Natural Farming has initiated a Market Narrative series to explore the levers that will augment consumer demand to shift the entire food system towards Natural Farming. As part of this series, we are happy to share the first publication on "Nutritional Benefits of Naturally Grown Products". This science is still evolving and needs further exploration. This publication is to engender a discussion and interest in its research.

Minhaj Ameen

Anchor

National Coalition for Natural Farming

Abstract

This discussion paper explores the various added and additional nutritional benefits that naturally grown foods provide when included in the daily diet instead of the conventionally-grown foods that we widely consume now. We use the term naturally grown foods to cover the various kinds of foods produced or cultivated through agricultural practices, eliminating chemical inputs for ease of understanding. This paper aims to provide an overview by summarising some of the available research and studies on nutrition and health benefits from naturally grown foods. It also seeks to light the need for more extensive studies that can conclusively put forth the impact.

Introduction

Sparked by the surge in consumption trends of naturally grown food, there is a newfound interest in the nutritional benefits of chemical-free agricultural products *vis-a-vis* conventional produce. The optimistic yet layman answer to the question - Does the nutritional index of naturally grown food is high compared with chemically grown food? Most likely is a rock-solid “yes”. The perception emanates from the many anecdotal stories we hear going around in India, which reminds us of the human might and brain in previous generations who had a better quality of food put on their plates. While this includes the reduced processing of food as a premise, it at the same time also goes back to the chemical-free and ecologically managed farms.

The good news is that there is some research to back the claims of these anecdotes. These optimistic accounts show that the research on the topic is limited both in quantum and purview. It is essentially due to the cost involved (Mie et al., 2017) and the unpredictable and unforeseeable impact it could have on human physiology. Some researches had also found varied results when the same crops were grown in two different settings. Other limitations when trying to prove consistency in the works is the micro-climatic conditions, agroecological variance, soil conditions and type, local farming practices, diverse inputs, etc. have a much more significant effect on the resultant crop. The limitations take away the consistency in results, and

it becomes challenging to prove the premise each time scientifically. Some research does not agree and states that there is no substantial difference between foods grown using either method, be it chemical-intensive or natural. It could suggest selective reporting or due to lack of standard measurement and reporting. Yet, no studies have ignored that pesticide residues are a significant threat and cause numerous issues when ingested (Baranski et al., 2014).

On Antioxidants

The plants under natural farming are more prone to pest attacks, pathogens and diseases. In defence of these, the plants produce higher amounts of phenolic compounds, which in human bodies act as antioxidants (Pedro et al., 2019). Thus, research papers that conclude in favour of higher nutritional content and benefits of naturally grown foods have almost always brought up the fact that naturally grown foods have higher antioxidants (Baranski et al., 2014). Antioxidants are of various kinds and go by different names, with each one helping the body differently. There are isoflavones, anthocyanin, carotenoid, polyphenols, selenium etc. which help significantly with immunity building. They remove the free radicals in the body and have positive anti-cancer and immunomodulation effects; they have anti-ageing properties, better eyesight, skin protection, and osteoporosis prevention (Yu et al. 2018). Antioxidants have also been found to protect the human body against chronic diseases, including CVD, non-communicable diseases, certain cancers like prostate and neurodegenerative diseases (Baranski et al., 2014).

These phenolic compounds also make it easier for the plants to absorb other soil nutrients, hence adding a higher and more expansive nutritional value. Some water-soluble vitamins such as Vitamin C and Vitamin E have been found in higher quantities (Popa et al., increasing, 2019). Some studies have found a negative correlation between the increase of chemical nitrogen fertiliser and phenolic compounds in plants. Hence when applying such chemical-intensive inputs increases the yields, it lowers the beneficial antioxidant content in crops (Baranski et al., 2014). Another important aspect is that of taste. Research shows that plants grown naturally have higher levels of flavonoids and sugars (Popa et al., 2019), directly linked to the taste of

fruits and vegetables (Yu et al., 2018). Some other attributes, along with the better taste, are looks, colour and texture, which is more tender (Yu et al., 2018). Research also shows that naturally grown foods have higher fibre content and dry matter, which increases the health benefits of the food (Yu et al., 2018).

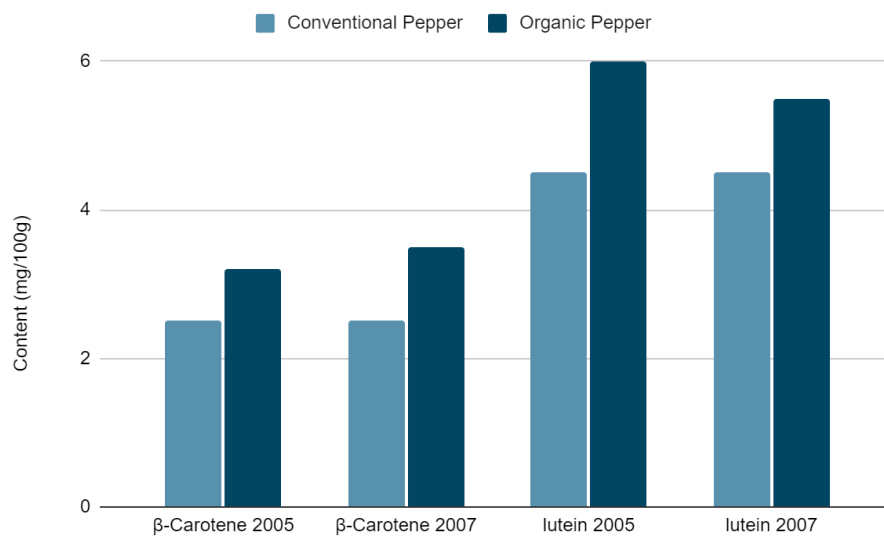


Figure 1: The carotenoid content of conventional and organic pepper. (Source: Yu et al. 2018)

On Minerals and Vitamins

Essential minerals such as potassium, phosphorus, magnesium, zinc, iron, calcium, copper, etc. are found to be higher in naturally grown foods (Baranski et al., 2014). It is also noted that there is a diversity of minerals in naturally grown foods due to the soil management practices, which include composting, animal manure, application of natural fertilisers and making available diverse nutrients to the soil. The soil texture also plays a massive role in this. Due to a more porous soil, the roots can grow longer, which enables them in absorbing nutrients from a wider range of soil layers. Better nutrition to the ground also enhances root growth (Smith, 2012) which makes them more robust at extracting nutrients from deeper layers of soil. Unlike chemical-intensive farming, where only three elements - nitrogen, potassium and phosphorus, are given to the soil making the soil compact and hard, an integrated way of managing soil

enhances the soil organic matter, which has proven to give the plants and hence the fruits a better structure (Wood et al., 2018). It is found that a better soil structure and higher organic matter in soil helps the plants in higher cation exchange (Wood et al., 2018) which increases the plant’s capacity to exchange micronutrients from the soil. Increase intake is also associated with more nutrition in plants. Thus, it could address the problem of **hidden hunger** that is facing society today. *Most of the crops grown today are grown not for their nutritional content but their calorie content (Wod et al., 2018).* This leaves a huge gap between the nutrition requirements of the body and nutrition availability. Even when the prescribed amount of food is eaten, the nutrition achieved is not as per the body’s requirements. With naturally grown foods, this can be changed for the better. Natural Farming practices also promote diversity on cropland which implies that there will be diversity of food groups available on the plate. This can be directly linked to consumption of diverse minerals and vitamins and other nutritionally beneficial compounds.

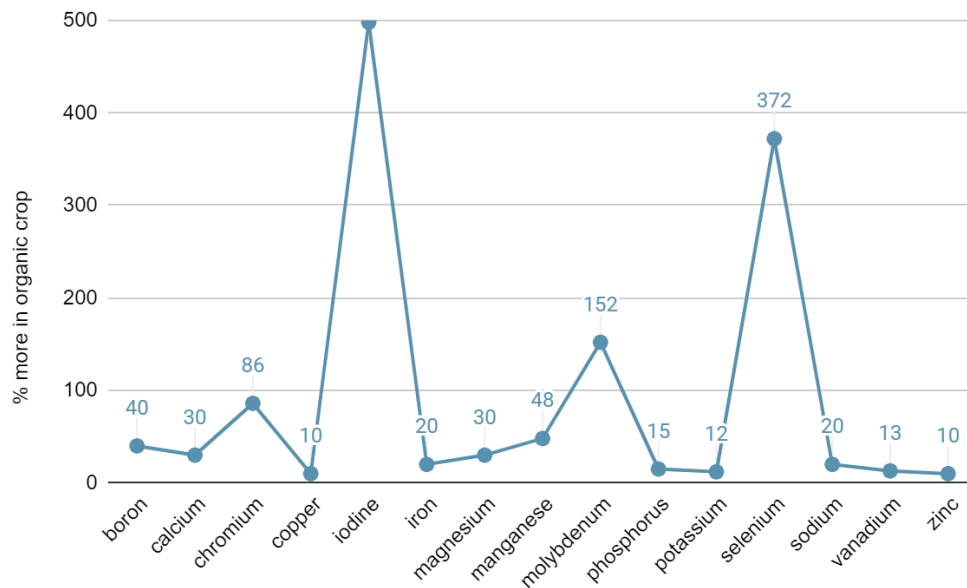


Figure 2: Mean percent additional mineral content in organic compared to conventional crops.

(Source: Worthington, 2001)

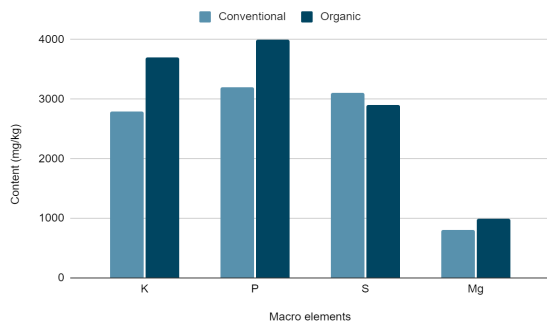


Figure 3: Macro elements of conventional and organic corn grains. (Source: Yu et al. 2018)

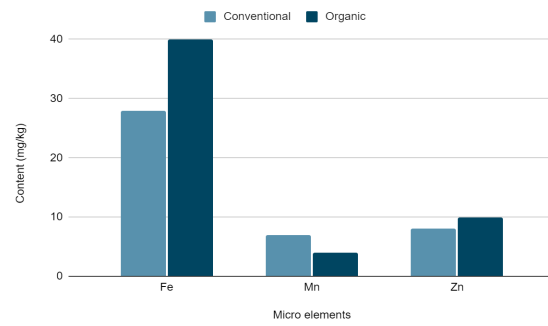


Figure 4: Micro elements of conventional and organic corn grains. (Source: Yu et al. 2018)

On Toxic and Heavy Metals

Toxic and heavy metals are a huge risk when they find their way into the body and exceed the minimum tolerable amounts. These elements are not present in the natural fertilisation practices and hence naturally grown food is devoid of these elements. Chemical intensive farming uses fertilisers which also includes contents derived from industrial wastes (Worthington, 2001). It has been found that cadmium (mostly found in phosphate fertilisers) especially finds its way into the human food streams due to the over utilisation of chemical fertilisers in agriculture (Mie et al., 2017). As more and more of these fertilisers are used year on year, the soil gets further contaminated and the absorption of these toxic heavy metals becomes higher. Even the excessive use of nitrogen fertiliser, which is most commonly and widely used for soil fertility management in conventional farming practices, has ill effects due to excessive application. When excess nitrogen is made available, plants cannot process this to make constructive use of it and start turning it into nitrates which it stores in its green leafy parts. Nitrates in the body have damaging effects on blood vessels and can cause heart diseases. Nitrates also get converted to nitrites which can oxidise hemoglobin in the body and cause intoxication as well as cancer (Yu et al., 2018). The other commonly applied chemical fertiliser is potassium. Higher potassium levels decrease the absorption levels of magnesium. Since phosphorus absorption is dependent on magnesium in the plant, reduced magnesium

levels also decrease phosphorus absorption. It is evident that the three majorly used fertilisers in chemical-intensive farming can cause more harm than good. Heavy metals have the potential to cause loss of memory, damage nervous systems, infertility and cancer (Yu et al., 2018).

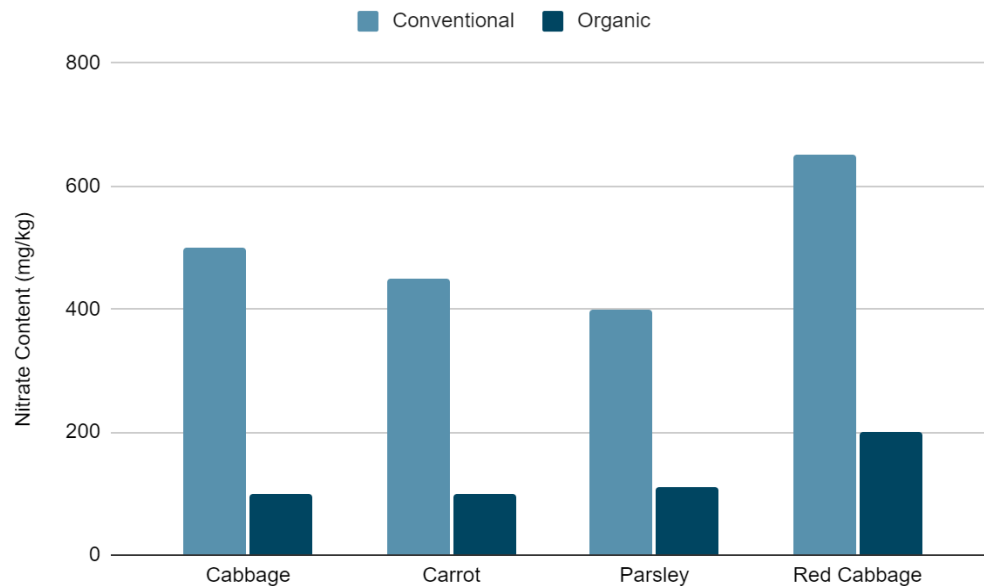


Figure 5: Nitrate content of the conventional and organic vegetables. (Source: Yu et al., 2018)

On Proteins

Studies have found that naturally grown food contains lower levels of proteins when compared to conventional foods. This is explained by the excess nitrogen applied in conventional farming, which is converted into proteins. With natural fertilisation methods, there is no way of artificially increasing the nitrogen content in the soil. This makes only basic levels of nitrogen available. Yet the studies which have analysed the proteins in naturally grown food have held them superior in comparison to conventional food proteins. Proteins can consist of up to 20 types of amino acids in different compositions of which 8 are essential amino acids (Yu et al., 2018). In naturally grown foods which are considered to have better structure and higher nutritional value, the proteins are found to contain a wider variety of amino acids. Hence the lower levels of proteins in naturally grown food is offset by the more essential amino acids which constitute a better quality of proteins (Popa et al., 2019).

On Pesticide Residues

Pesticide residues are an early accepted phenomenon of side effects from chemical-intensive farming which is not the case with natural farming and natural foods may reduce exposure to pesticide residues (Baranski et al., 2014). The common suggested practice of including heavier and more frequent portions of fruits and vegetables in food falls on face due to this agricultural evil. With higher consumption of fruits and vegetables, the accrued amounts of pesticide residue in the body increase well above the permissible limits (Mie et al., 2017). This classic dragon and cliff situation is very commonly argued in this relation and stands to prove hugely in favour of naturally grown foods. Pesticide residues are also one of the most widely researched topics and have been known to pose a great danger to food safety. Even though the highly poisonous and toxic pesticides are banned, some other kinds of chemical pesticides are still used in agriculture (Yu et al., 2018). With the permitted pesticides, studies have found pesticide residues to be above MRL (Maximum Residue Level (Baranski et al., 2014). Chemical pesticides are also sometimes used very close to the harvest time of the crop which increases the chances of it reaching the food plate. Due to these various reasons, these harmful elements which inevitably find their way into the human body culminate into a plethora of diseases and disorders causing carcinogenic, teratogenic and mutagenic harms (Yu et al., 2018). Especially in children, pregnant women, sick and diseased and older people, the issues tend to exacerbate. In children there can be issues with the cognitive abilities being heavily impaired, a host of neurotic disorders, underdevelopment of brain and body, delayed psychomotor, cognitive and mental development, attention deficit disorders, hyperactive disorders, learning disabilities, lower IQ, ADHD and behavioural disorders, etc. For pregnant mothers being exposed to pesticide residues, the unborn child is at huge risk of abnormalities, brain growth and functioning, sexual development. People are also at a huge risk of Parkinson's disease, type-2 diabetes, certain kinds of cancers including non-Hodgkin lymphoma, childhood leukaemia, endocrine disruption, gastrointestinal disorders, reduced sperm count in men, etc (Mie et al., 2017). Traceable amounts of pesticide residues have been found in urine samples collected from children. This also includes some pesticides which are banned from use. Even with many approved pesticides, which are to be used in recommended quantities, traceable particles of

residues reach the human body. There is no research which can show that the consumption of these approved pesticides causes no harm, both in short and long term. While naturally grown foods don't necessarily have proactive qualities which act to reverse any diseases, they do not expose the consumer to the very diseases and disorders due to added chemicals. There are also studies that do show that some properties of naturally grown foods do in fact help in keeping these diseases at bay and also advised for consumption during treatment of some diseases.

On Poultry and Cattle

Organically bred poultry and cattle have been proved to give milk and meat which has a high content of omega-3 fatty acids, sometimes as high as 50% more (Popa et al., 2019). This is mostly due to the difference in feeding regimens and the livestock management which is based more on the needs of the animals. For feed, organic natural livestock management systems use fresh pastures of grass and clover, roughage derived from fresh, dry and silage all of which is high on fatty acid content (Baranski et al., 2014). This has proved to produce better quality milk and eggs with high nutritional value. The free-range breeding and higher space availability for the organically grown poultry and cattle betters the quality of meat while reducing the diseases and stress endured (Mie et al., 2017). The quality of meat is found to be delicate yet compact, much leaner and leading to better taste while holding better nutritional components (Yu et al., 2018). There is higher content of essential fatty acids with greater polyunsaturated fatty acids content which is favourable for human health (Popa et al., 2019). The use of antibiotics in organically bred cattle and poultry is almost negligible which saves the consumers from excess exposure antibiotic-resistant bacteria (Popa et al., 2019) and side effects of excessive ingestion of antibiotics. The hormone injecting practices are not practised in organic breeding which also saves consumers from multiple hormone related health disorders.

On Health

Taking a broader overview, many verbal accounts of human perceptions regarding the accrued health and nutrition benefits of naturally grown foods have been in favour. A perception mapping study which was undertaken to assess the post ZBNF impacts with Rythu Sadhikara Samstha (RySS) in Andhra Pradesh also found that many of the people surveyed had experienced betterment in their overall health and wellness. There is a reduced incidence of health issues and a reduction in their healthcare expenditure. It also observed that people reported a stabilisation in Non Communicable Diseases after they had started growing and consuming natural farming products. It also recorded that one of the major reasons for farmers to shift to natural farming from conventional farming was given as health. When asked about the perception of safety, a significant chunk of both natural and conventional farmers responded that they think naturally farmed foods are safer due to the absence of use of chemicals. It was also found that the respondents believed that naturally farmed products had a higher shelf life. This study synthesising the personal accounts of consumers and growers of natural foods suggested that natural practices employed in agriculture can help address health issues greatly (Choudhary, 2019). It was also noted that the composition of soil and the content of various elements in the soil, especially soil organic matter increases the nutritious properties of food (Wood et al., 2018). The principles and practices of natural farming methods concentrate on regenerating the soil organic matter, increasing soil microorganisms (Worthington, 2001) and focus on providing nutrition to the soil to make it healthy which in turn helps the plants to grow healthy. Healthy soils can provide for all plant needs which is also catalysed due to the higher presence of microorganisms. Fertilising the soil with naturally occurring substances also adds a diversity to the nutrition being provided to the soil. This helps the plants growing in that diverse environment to absorb those diverse minerals, vitamins, metals etc. The study done to understand the effects of soil organic matter (Wood et al., 2018) concluded that soil organic matter, rather than just mineral or chemical fertilisers, drives both crop yields and nutrient contents and hence relevant impact on human health and nutrition. Although there is no research which has directly studied the difference between accrued health benefits in human beings from conventional and naturally produced food, there are animal

studies which show adverse effects on functions of reproduction and infection resistance with conventional food consumption as compared to natural food. A study also reported increased sperm count in men with increased percentage of natural food ([Worthington, 2001](#)). In children, several studies have found lower prevalence of allergy or atopic diseases when the family prefers naturally grown food. Some studies also correlate BMI with consumption of naturally grown foods. Hence it is observed that there are lower chances of obesity in people who consume these foods ([Mie et al., 2017](#)).

Conclusion

Most of the above studies are in the context of western countries and the positive brief that we draw from them makes it imperative to conclude that more studies and research need to be taken up in Indian context as well. There is a dearth of a scientific context in India which argues in favour of non-chemically grown food even though India has been a country which practiced agriculture using agro-ecological and biological practices, in line with today's understanding of natural farming. India has huge potential to adopt natural farming on a wide scale once again, especially with the innate knowledge that farmers here hold on the subject and the numerous government programmes being launched in the country to promote natural farming. Recent Indian studies are sociological accounts giving qualitative data on benefits or positives of naturally grown food and this can be further validated through scientific research. This can help various stakeholders in bringing to light the benefits from consumption of foods which are grown free from chemicals and with use of natural practices and inputs.

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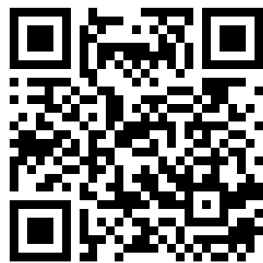
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