



Problem Statement

Most scientists and policy makers acknowledge that we are living in an era of climate change associated with several major global challenges (GLOPAN, 2016; Godfray et al, 2010):

- The world is getting hotter (at least 2°C rise in the global average by 2050).
- The population is expanding (it is predicted to be 9 billion by 2050).
- Resources for production are being depleted (land and water quality and soil fertility are declining).
- Our diets are becoming more limited – we rely on only three crops for 50% of our food and feed.
- A global processed diet is unhealthy – non-communicable diseases related to over consumption now outnumber those due to under-nutrition.

We need to make changes to our food production systems – sooner rather than later – to literally *transform agriculture*, for the good of humankind, for health and for the planet.

There are several options available to us to achieve this goal. The approach we focus on in this policy brief is of dietary diversification through the use of “Forgotten Foods”. We propose a food-based approach since the consumption of a diverse range of foods confers additional nutritional and social benefits than by only enhancing micronutrients into existing staple crops.

In this brief, we focus specifically on plant-based forgotten foods, since this is the remit of CFF. However, we also embrace the rediscovery and increased utilisation of animal and insect based species – together they will contribute to the proposed “Forgotten Foods Network”. We anticipate that other institutions more closely linked to animals, insects and marine species will advocate the increased use of such species in the diets of the future. This brief complements the earlier CFF policy brief on dietary diversification.

Introduction

Our current diets are increasingly uniform and depend on ingredients from the same crops. Many of these are brought along vulnerable supply chains from exporting countries. Our globalised food systems are at risk. We must diversify our diets with foods that provide nutrients and not just calories (Toledo and Burlingame, 2006). Such foods need ingredients from a wider range of crops (many that can be grown locally) as well as the major staples. We must put nutrition at the heart of our food systems. This is where forgotten foods – the traditional foods and crops that our ancestors ate – could play a vital role.

Forgotten Foods

There are thousands of 'forgotten foods' that are being increasingly displaced by modern, uniform and processed foods. Such foods include ingredients from neglected crops, animals, vegetables and even insects as well as traditional varieties of the major staple crops. Each of these forgotten foods deserves to be evaluated to explore which can nourish future generations. There are many reasons why foods have become forgotten.

Demographic Shift

Dietary change accompanies the migration from rural to urban living. In fact it becomes a necessity since the foods commonly produced in rural areas may not be available in the urban setting. Many fruits and vegetables that are seasonal and available in abundance at the site of production, never make the journey into cities. Populations need to travel to find the foods of their past. Urban lifestyles are also associated with having less time to search for and prepare foods. Fast foods and ready meals become the first choice for many seeking to juggle long hours of work and travel. Dietary diversification suffers.

Access to forgotten foods is difficult. Supermarkets dominate the purchasing behaviour of many and dictate the types and prices of foods that are available. Rice, wheat and maize based products are so readily available, have long shelf life, and provide a range of tasty and desirable processed foods that displace diverse food products.

Supply and demand for forgotten foods – applying economic theory to forgotten foods tells us that they couldn't compete against the other more popular foods – low supply would mean a higher price, which would reduce demand in a market place dominated by cheap processed cereals from major species.

Meanwhile, in the village (at the site of production), forgotten fruit and vegetables are produced seasonally in gluts, the price is so low that the farmer has to give them away. The consumers have all moved away to the cities, so there is no demand. The whole harvest rots, so the farmer wonders what is the point in producing this crop. I don't receive any cash from it. I can't make a living out of it, may as well switch over to non-farming type of employment, move to the urban areas in search of work or produce another crop which demands a higher price (if I have the knowledge and capacity to do so).



Post harvest technology

Forgotten and underutilised fruits and vegetables have not benefitted from research into improved methods of post harvest storage, transport and processing into edible foods with a longer shelf life. By their very nature, they may be non-uniform, have hard seed coats, large stones, contain antinutritional components that must be removed prior to consumption and other factors that make them difficult and time consuming to process. Wheat was once a difficult crop to process. Decades of investment into breeding for uniformity and large grain size have culminated in a crop that can be fully mechanized and easily processed into flour for consumption. We can do the same for underutilised crops.



Displacement and migration



Leaving behind one's birth place for life in a new region – whether out of choice or necessity – is linked with a similar dietary outcome – change. Change means adopting the diet of the new home, be that a refugee camp for economic migrants and victims of war and unrest, or a new city for others. Inevitably, it is the poorest sectors of the unsettled populations who have to make the biggest dietary changes. Processed and fast foods are cheap and readily available in most urban areas. When price dictates the diet, the majority of people will opt for the cheapest (which is also the least nutritious and least diverse) option. The foods of the homeland become forgotten.

Economic development and displacement of populations – rural to urban migrants, refugees, migrants and expatriated communities – all gravitate towards a homogenous global diet that lacks diversity. A uniform diet provides us with food but not nutritional security. Why? Because it's easy; it's available; it's cheap; It tastes good and it signifies wealth and success.

Forgotten foods may be stigmatized for their link to poverty – 'poor man's food, the food of 'women farmers', the food we used to eat before we could afford any 'better' are terms associated with forgotten foods. Some of these reasons explain why they have been forsaken in favour of the popular foods of the majority. They have been forgotten as people aspire to a 'better' lifestyle, away from the drudgery of pounding grain to one where 'desirable' instant foods are available.

We need to change this mindset, remove the stigma associated with forgotten foods and rediscover the values that made them important in the diets of our ancestors. Forgotten foods have the potential to become the foods of the future – to become niche foods, special foods and with a role to nourish us in the climates of the future. There is a change in the right direction, as people start to understand the dangers of uniformity and the damage this is inflicting on the health of people and the planet.



Diversifying our food systems with forgotten foods

Since the beginning of agriculture, a period of approximately 10,000 years, the global population has grown from 0.1 billion to over 7 billion people (Esquinas-Alcazar, 2005). The majority of that growth (from 2.4 to 7.1 billion) has occurred in the last 50-60 years, since the beginning of the green revolution (US Census Bureau, 2008). This period also saw an unprecedented decline in the diversity of crop species on which we depend and a corresponding decrease in the diversity of cropping systems in which they are grown.

Early agroecosystems were a complex mixture of annual crops, perennial species and animals. These agri-silvo-pastoral systems have largely given way to intensive segregated animal and crop farming. Cropping systems include diverse forms such as agroforestry (crops grown amongst trees), sister planting (a tri-mixture of grains, legumes and vegetables that complement each other, nutritionally, architecturally and agronomically) or mixtures of annual crops (intercrops) through to uniform sole crops (single crop stands composed of the same variety of a single species) (Azam-Ali, 2003; Barber, 2014). In some cases, the same annual species, e.g. wheat, is cultivated in the same field as a monoculture over a number of years. Thus, the trend within modern agroecosystems has been towards a greater reliance on uniform crops, varieties and systems that are less diverse or complex than their predecessors. This reduction in the diversity of species and systems has inevitable, often unintended, consequences on the range of natural biological diversity that exists within them.

The 1960's (the era of the green revolution) marked a turning point for agriculture and for the diversity of agricultural systems. The urgent need to ensure global food security resulted in intensively produced high yielding varieties of wheat, rice and maize at the expense of more traditional farming practices and underutilised species.

Crop and system diversity

There are between 300,000 and 500,000 higher plant species (Wilson, 1999; Collins and Hawtin, 1999). Of these, about 30,000 are edible and approximately 7000 have been cultivated or collected by humans for food. However, fewer than 20 major species now account for more than 90% of global food production. The majority of edible food crops have fallen by the wayside as we depend more and more on major crops such as wheat, rice and maize. Together, these staple crops provide over 50% of plant-based human food, mainly as sources of starch. Apart from soybean and groundnut, legumes – the major sources of protein in poor countries – contribute less than 2.5% to the global diet.

Diversification of agriculture, of agronomic practices and of the end products, is a key to sustainable production, improved health and nutritional security. Current agronomic practice is for intensive production of monocultures, with a heavy dependence on fertilisers, pesticides and irrigation to maintain high yields. More traditional agronomic practices, such as intercropping, crop rotation, agro-forestry and sister planting are compatible with resilience to predicted climatic changes and diversification of agriculture (Barber, 2014; IEPS-Food, 2016)

The intensification of a few crop types has profoundly influenced the range and diversity of crop species and cropping systems in modern agriculture. In particular, it has resulted in the displacement of indigenous or 'minor' species and local cropping systems by more favoured 'major' species and at the same time a move towards more globally uniform systems of cultivation.

Diversification of diets

Eating a balanced diet derived from a diverse range of foods is key to optimal health and nutrition. Diversification of our diets is central to good health. The narrowing of current diets to rely on three or four key ingredients, has coincided with an increase in the incidence of diet related diseases of over consumption.

Forgotten Foods can feed the future

Many forgotten foods belong to local cultures and traditions. Knowledge about them, and the plants from which they derive, is often retained in the heads of older people. Usually, such 'vernacular' knowledge is passed across generations by word of mouth and through culinary traditions. However, traditional knowledge is often lost when communities are disrupted or when individuals move. We need to capture, harness and share, and use the knowledge of our forgotten foods for future generations before it is lost forever.

By exploring our own culinary histories and traditions we can help identify and celebrate the world's forgotten foods. Where such foods come from neglected crops that have been grown in vulnerable environments, they can form the basis of dietary diversification and nutritional security in climates of the future.



Examples of forgotten foods that have been rediscovered

Almost 30 years ago, William Stevens, reporting in the New York Times, narrated the story of the lost crops of the Incas (see box below). His story brought the plight of the Incan farmers (and their forgotten crops) into the headlines and started a mini-revolution with the race to 'discover the lost crops'. Almost 30 years ago, quinoa was unheard of outside native South American Indians and vegan circles. This tiny grain was a forgotten crop that provides highly nutritious food that could help feed the world. Today, it features on the menus of the smartest restaurants, has the prestigious title of super food and a price tag to match. It is the food of the moment (and the future). In fact it is so popular that the native Indians who once depended on it for their livelihoods can no longer afford to eat it.

An excerpt from a report by William K Stevens in Science in the New York Times, 1989 – The lost crops of the Incas

HALF a millennium ago in the Andes, the Incas created an agricultural wonderland. On irrigated mountainside terraces they cultivated an estimated 70 species of crops, almost as many as the farmers of Europe and Asia combined. White, yellow and purple roots. Beans that pop like popcorn. Cereal grains with twice the protein of wheat, rice or maize. Yellow, pink, red and candy-striped tubers. Potatoes with a naturally buttery taste. And a whole array of exotic fruits.

The Spanish conquistadors destroyed all that. To them the Incas were backward. They forced the Andean natives to replace crops that had held a valued place for thousands of years with European species like wheat, barley and carrots. With two exceptions, the potato and the lima bean, the lush variety of Andean agriculture sank into obscurity and was lost to the wider world. Now these "lost crops of the Incas" are being rediscovered and reintroduced around the globe as an exciting and nutritious addition to standard urban diets and a valuable source of agricultural income for the third world.

A few of the crops, particularly roots, grains and legumes, are thought to have the nutritional content, adaptability and capacity for mass production that could turn them into staple foods like the potato. But in many cases, much scientific work lies ahead before their potential can be fully developed.

A handful of Incan crops are already becoming familiar to urban shoppers in a number of countries. Incan delicacies such as the cherimoya, the sweet, juicy fruit with a creamy texture and the papaya-pineapple-banana taste; the tamarillo, or tree tomato; several varieties of multi-colored Andean potatoes; the protein-packed grain called quinoa, and a small yellow-and-purple fruit, called the pepino, or pepino dulce.

Developing Incan crops as staple foods would not only introduce variety, but would also reduce the risk of crop failure among other staples. "When a farmer is able to diversify," said Mark Dafforn, a staff associate with the study, "it makes life safer."

Unlike other fruits and vegetables from tropical latitudes, the Incan crops can be grown in cool temperate zones. They are especially promising as potential export crops in mountainous regions not only of South America but also of Asia and Africa, said Dr. Vietmeyer. They can also be grown in industrialized countries "where the horticultural establishment of the world is concentrated," he said.

Besides the cherimoya, pepino, tamarillo and quinoa, the study found a number of other "lost" Incan crops to be particularly important, promising or interesting. These are a few of them:

Arracacha - a smooth-skinned root that looks like a white carrot and tastes of celery, cabbage and roast chestnuts.

Ulluco (pronounced oo-YOU-co) - this brightly colored root comes in yellow, pink, red, purple and candy stripes. Its flesh, which varies from white to lemon-yellow, has a smooth, silky texture and a nutty taste. The future for this crop seems particularly bright. It could be grown in many upland regions of the third world and has already done well in Sri Lanka.

■ Where will we find our next food of the future?

We believe that there are more “quinoa” crops waiting to be (re)discovered and that many of the foods that can nourish us in the future will be found amongst the 30,000 plus domesticated plant species. We don’t need to rely on just the improved species that currently feed us. Rather, we need to look beyond only major species into the diverse basket that are the foods of our ancestors; foods that used to be commonplace in the diet of past generations, but which have been neglected and forgotten by mainstream research.

We need to find foods from our past, measure their nutritional value, test their suitability for changing climates and make novel products and cuisines from them that are nutritious and desirable to consumers. With research, education and advocacy, we can help feed the future with forgotten foods. The link with research is critical. Without providing an independent evidence-base, we cannot identify and improve those forgotten foods and forgotten crops that can meet the needs of a global population in a changing world.



With a consolidated research effort and significant investment we firmly believe that the foods of our past can:



Offer a range of nutrients that are lacking in the major 'staples' that now feed us

Have the potential to grow in the unpredictable and changing climates of the future

Can be used to naturally diversify diets and transform agriculture for good.

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Priorities

The priorities for policy makers, funders and researchers are to:

1. Collect information on the foods that were commonly consumed by our elder generations. Document and share this information in a format that is readily accessible.
2. Identify potential species that were cultivated by previous generations but which are now difficult to find or no longer available.
3. Explore appropriate methods of cultivating these species – moving away from the highly intensive, agriculture of today.
4. Assess the nutritional content, processing quality and safety of these foods and their potential to replace the major staples in a number of processed foods and feeds.
5. Evaluate their contribution to diversification of the diet and nutritional security.
6. Through networking, research initiatives and global collaboration, demonstrate how forgotten foods can help transform agriculture for good.

References

Azam-Ali, S.N. (2003). Multicropping. Enc App Pl Sci pp 978-984. Elsevier Ltd.

Barber D (2014). The Third Plate. Field notes on the future of food. Abacus, Little, Brown Book Group, London, UK.

Collins, W.W. and G. C. Hawtin (1999). Conserving and Using Crop Plant Biodiversity in Agroecosystems. Pp. 267- 281 in Biodiversity in Agroecosystems (W.W. Collins and C.O. Qualset, eds). CRC Press, Boca Raton, Washington.

Crops For the Future (2017). Dietary Diversification for Enhanced Human Nutrition; the role of underutilised crops. CFF Policy Brief 1.

Esquinas-Alcazar (2005). Protecting crop genetic diversity for food security; political, ethical and technical challenges. Nat Rev Gen 6, 946-953.
GLOPAN (2016). Food Systems and Diets: Facing the challenges of the 21st century. Global Panel on Agriculture and Food Systems for Nutrition, London, UK.

Godfray HCJ, Beddington JR, Crute IR, Haddad, LD, Muir JF, Pretty J, Robinson S, Thomas SM and Toulmin C (2010). Food Security: The Challenge of Feeding 9 Billion People. Science, 327 (5967), 812-818.

IPES-Food (2016). From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems. International Panel of Experts on Sustainable Food Systems.

Stevens WK (1989). The Lost Crops of the Incas. Science, New York Times, October 31, 1989. Available at: <http://www.nytimes.com/1989/10/31/science/rediscovering-the-lost-crops-of-the-incas.html?pagewanted=all>

Toledo A and Burlingame B (2006). Biodiversity and nutrition: A common path towards global food security and sustainable development. Journal of Food Composition and Analysis 19, 477-483.

US Census Bureau (2008) available at <http://www.census.gov/main/www/popclock.html>

Wilson, E.O. (1999). The diversity of life. W.W. Norton, New York, London, 413pp

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