FOOD PLANT SOLUTIONS
ROTARIAN ACTION GROUP

Founded by the Rotary Club of Devonport North and Rotary District 9830
based on the work of Bruce French, Food Plants International

Selecting potentially important plants for inclusion in a Field Guide plant list

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1. Brief overview

This document contains detailed guidance on selecting plants for inclusion in a field guide. Please read in its entirety to fully understand what is required. The following dot points outline the essential elements of compiling a plant list for a Field Guide:

- The plant list should have approximately 40 edible plants, all high in nutrients, and all known to occur in the country of interest.
- These plants should cover all the major food groups, with about 5 – 8 plants in each group:
  - Starchy Staples
  - Legumes
  - Leafy greens
  - Vegetables
  - Fruits
  - Nuts, Seeds, Herbs and other foods
- Commercially grown plants should be avoided, as the purpose of the Field Guide is to highlight highly nutritious plants which are currently under-utilised, and which are known to be adapted to the local environment and so require minimal inputs.
- The plant list should be provided in a table, listing the Scientific and Common names for the plant. The Common names should be in English (as a minimum), but if local language names are known, they can also be included.
- A brief reason justifying the inclusion of each plant should also be given. This will help the Field Guide Technical Team understand why plants have been selected, as there may be local reasons for inclusion which are not immediately obvious from a study of the nutritional value.
- A Word/Excel file with a template is provided for compiling the plant list.

2. Introduction

The Food Plants International database contains entries for over 26,000 edible plants. Experience has shown that provision of information on a small selection of plants that are relevant to the country or region of interest is a more effective way to engender interest in the potential of under-utilised food plants. For this reason, Food Plant Solutions has taken the approach of using the information in the FPI database to develop field guides which contain information on 40 – 50 plants that are potentially useful in addressing malnutrition in the country of interest.

Whilst the "Food Plants of The World" database contains comprehensive information and references, there are some key principles which can assist selection of plant species for inclusion in a field guide.

This document needs to be read in conjunction with "Using the World Food Plant database", which covers the mechanics of using the database and extracting data. These notes provide some principles of plant selection for the compilation of a draft plant list for inclusion in a country specific Field Guide of edible plants for a region.

The philosophy of Food Plant Solutions is to highlight the plants that are most valuable in addressing hunger, malnutrition and food security. Hunger is largely satisfied by bulk, as can be found in an energy food that is high in starch. Malnutrition can be addressed with specific focus on key nutrients, but the simplest way to overcome malnutrition is to include a range of foods and food groups in the diet. If this is done, nutritional deficiencies in one plant will likely be met by another. Food security can also be addressed by growing a range of plants. If one plant fails, others may survive to provide the necessary food. In addition, a variety of plants will provide a range of maturing times, which then provides a food supply over an extended period of time.

Notes on plant selection: The purpose of developing a field guide is to highlight under-utilised plants with the potential to make a material contribution to addressing malnutrition in the country of interest. For that reason, there a two categories of plants which should not be included in a plant list for a field guide, unless there are very good local reasons for their inclusion. These are:

Spices, condiments or flavouring foods:

- Such foods are normally used in small amounts, so their contribution to dietary nutrition is likely to be small.
- Flavouring foods are normally part of local culture, likely to be used anyway, and inclusion in field guides is unlikely to be an influence on their use.

Commercially and widely grown foods:

- Crops that are widely grown, either for commercial or domestic consumption, are likely to be already well understood, and will normally involve improved seed lines and inputs that may be unaffordable.

Further details on this issue are included in Section 4.

Notes on nutritional content of plants:

- Please check the Vitamin A level in each plant selected for the list, as the database includes some levels with International Units (IU) and others in µg/100g. The USDA nutrient database is a good starting point (http://ndb.nal.usda.gov/ndb/search/list) but information can be found through other web sources.
- There is a bug with zinc levels in the database that we are trying to fix, so please also validate the zinc levels of all plants. If the zinc and iron levels extracted from the database are exactly the same, you may have encountered the bug and will need to validate the zinc data. The process for this is outlined in Section 4.3 of this document.

3. What constitutes a potentially important plant?

Clicking the "Detailed Information" tab that appears in the "list view" of the database provides comprehensive information on each plant. This information should be read as part of the decision making process and can be used to guide the selection of potentially important plants. A "potentially important" plant should preferably be low input in both water and/or fertilizer. It does not have to be native, but should be adapted to the climate of the region of interest. The edible part of the plant should require minimal preparation inputs. For example, a shortage of firewood is a major concern in many developing countries. Similarly modern fertilizers, refrigeration and extensive water for washing/leaching are also not always available.

Details about the plant's preferred habitat provide useful hints as to its suitability or otherwise. It is also beneficial if more than one part of the plant can be eaten. It should not be rare or endangered and should be easily propagated. (Many plants considered to be weeds meet this specification e.g. spp. of *Amaranthus.*) Plants that take a long time to develop to a mature state (e.g. date and coconut palms) should not be considered as primary food sources, but can form part of a longer term food supply strategy.

In many countries, the best soils have been taken by commercial enterprises, so the ability to grow on poor soils may be particularly important. If local plants are growing well on poor soils, they are clearly well adapted and this is an important factor to consider.

Once a list has been compiled, the individual plants can be cross-checked using a variety of sources. Although the references to other information sources in the database are extraordinarily comprehensive, it is unlikely that people will have access to many of these. Other references can be checked from an online search and sites such as Wikipedia.

The following is a checklist of points to consider when looking at the information and descriptions of plants for inclusion in a Field Guide.

3.1. Habitat

The plant needs to be able to grow in the area of interest and preferably is already growing there.

Water needs – Tolerance to low and/or irregular rainfall, flooding or salinity may be important for some regions.

Temperature requirements – Is it frost sensitive, will it prefer warmer or colder temperatures? Do not assume only tropical plants grow in tropical areas. Temperate plants may be more appropriate for elevated regions. Do the seeds, tubers or flowers have a dormancy requirement of cold temperature? Does the temperature requirement match the seasonal water availability?

Day length – This is unlikely to be a limiting factor if the plant is naturally occurring in an area, although this may need to be considered for introduced species. There is little or no information provided in the database on this aspect of plant growth, although it is a factor that may need to be considered in some cases. For example, onions have very specific day length requirements in order to form bulbs.

Soil – Plants can have very different soil requirements, some need acid soils (pH <7) and some prefer neutral or alkaline soils. Generally, the soil type is a combination of the underlying substrate and climate. For example, soils in arid areas tend to be less acid whilst soils in high rainfall areas tend to be more acid. Soils from rocks such as granite tend to be acid whilst those from limestone tend to be neutral or alkaline. Many regions in the developing world tend to have poor soils with low natural fertility, so a high input crop will probably not be suitable.

Light – Are the plants tolerant of shade or full sun?

3.2. Growing

Reproduction – How easy is the plant to propagate? Does it grow from seeds, cuttings or tubers and are there any special treatment requirements? Is propagating material easy to obtain? A primary aim is to select plants which are already local and so can provide a ready source of seed or propagation material.

Growing period – Is the plant perennial or annual? How long before the edible part is produced and ready to eat?

Ease of growth – How easy is it to grow? Any weed is almost certainly going to be an easy plant to cultivate, although some caution needs to be exercised to make sure that one is not introducing a potential pest. Are a male and a female plant required in order to set fruit?

Potential hazards – Are certain parts poisonous? Is this likely to be an issue for children? Does it have any drawbacks such as stinging hairs etc.? Such characteristics may need to be highlighted even if it does have good nutritional value.

Cultivation and harvest – What is required? Does the plant require a lot of hard physical labour at any stage of its life-cycle? How easy is it to harvest? Do the edible parts require special facilities for storage? How long will they keep after harvest in ambient storage conditions?

3.3. Use

A plant with multiple edible parts is clearly better than one with only one. Are special preparation techniques required before eating? Are these techniques known and available? Is it regarded as edible and liked, or is it only used as a food if nothing else is available?

4. Suggested procedure for compiling your plant list

It is acknowledged that the person compiling the initial selection may not have been to the place in question and may have little knowledge of the area, its people or its culture. It is important to do some research as to the physical, natural and social geography of the place. Useful websites include:

- Wikipedia
- CIA
- Lonely Planet
- US Dept. of State
- InfoPlease

These are only a few and no doubt individuals will know of others. It does not matter which sites or references are used so long as they provide accurate information to help determine the plants that need to be included in a first draft of a field guide. Unless information comes from sources known to be reliable, it is good practice to cross-check it against other independent sources. It is important to make sure that source documents are different, i.e. if two sources both quote Wikipedia, then the information is not independent. Much of the information on the internet needs to be regarded with caution as it is not subject to any review process which can verify what is written.

Different regions, or even areas within a region, will have different challenges – e.g. differing altitudes or sub-climates, maybe drought or flooding, soil quality, labour (i.e. in many parts of sub-Saharan Africa the shortage of fit adults due to AIDS limits what communities can achieve). Care is also needed when making decisions to avoid value judgements as to the appropriateness or otherwise of certain plants or

plant parts and their preparation/use. Imposition of western values is not part of the brief. It is worth noting that preparation of these lists of food plants is an iterative process. Compilations will be checked by the Food Plant Solutions review team as well as by individuals in the designated country or region before finalisation.

The draft plant list should be developed for the specific country and it is important that it is not too long. It is suggested that a total of 40 – 50 plants are selected across all food groups, with at least five plants in each food group (starchy staples, legumes, leafy greens, seeds and nuts, fruits and vegetables). Once the plant list has been compiled, it should be forwarded to the Food Plant Solutions Team for review prior to the finalisation of the draft field guide. Food Plant Solution Staff will compile the draft field g to ensure consistent delivery of information. The Technical Support Specialist (TSS) is not required to produce the draft field guide document.

It is suggested that the search of the database is first done by nutritional value to get a short list and then see which part of the plant falls under one of the major food groups listed below. The process of searching has been covered in "Using the World Food Plants Database".

4.1. Food value

The following guide for daily nutritional requirements is repeated from the "Using the World Food Plants Database" document. These values will vary with gender, conditions such as pregnancy and lactation, and age. Diets will also be influenced by intake of animal flesh.

- Energy >10,000 kilojoules
- Protein depends on body weight and age, but from 20 g/day for children, to 80 g/day for physically active men
- Provitamin A 600 - 1,000 mg/day
- Provitamin C 75 mg/day
- Iron declines with age, but over 15 mg/day for children and women, and less than 8 mg/day for adult men
- Zinc up to 15 mg/day depending upon age, infants need a lot less

4.2. Food groups and plant families

Most of the world's food is confined to a relatively small number of plant families which are listed below. Do not discard a plant if it is not from one of these families – the list is provided merely to give some guidance and to show where our food comes from.

- Poaceae or Gramineae – cereals all come from the grass family (Poaceae or Gramineae). Within this family are a number of genera that are grown around the world. These include corn (*Zea*), wheats (*Triticum*), various rices (*Oryza*), oats (*Avena*), barley (*Hordeum*), rye (*Avena*), sorghum (*Sorghum*), and millets (*Panicum, Eleusine, Pennisetum and Setaria*).
- Fabaceae – another important family is the Fabaceae which includes all pulses and legumes.
- Solanaceae – the nightshade family (Solanaceae) includes potato, tomato, eggplant, capsicum, tamarillo and nightshades. Some members of this family have varying levels of a naturally occurring toxin called Solanine. Understanding how this toxin is eliminated from food is an important factor in use.

- Convolvulaceae – sweet potato, morning glory and kang kong are all members of this family.
- Amarylliaceae (Alliaceae) – the Amarylliaceae contains onions and garlic, although they are recorded in the database as being in the Alliaceae, which is their previous family name.
- Cucurbitaceae – the squash family (Cucurbitaceae) includes pumpkins, water melon, cucumber, zucchini and squash.
- Malvaceae – the hibiscus family (Malvaceae) is important in the tropics and includes plants such as okra.
- Brassicaceae – brassicas such as cabbage, cauliflower, mustard etc. are in this family which used to be called Crucifereae.
- Apiaceae – This family, formerly known as Umbellifereae, includes plants such as carrots and parsnips, and herbs such as parsley and fennel.
- Euphorbiaceae – cassava, a particularly important plant in the tropics, is from the Euphorbiaceae family. Many members of this family, including cassava, have naturally occurring toxins which must be eliminated during preparation to ensure they are safe to consume.
- Amaranthaceae – an important family, which includes many edible weeds. Important members of this family are spinach, quinoa, silver beet, chard, sugar beet and beetroot. Fat hen, which is a weed and a good food source, is in this family. Some of this family are listed in the database under their previous family Chenopodiaceae.
- Combretaceae – the Combretaceae is an important family for nuts.
- Rosacea – The rose family is an important fruit plant family which includes apples, pears, stone fruit, strawberries, raspberries and rose hips.

It is anticipated that over time a number of Field Guides for different countries will be produced. To ensure consistency in presentation, a formatted template has been prepared, and plants have been classified into six basic groups based on their food value:

1. Starchy staples
2. Legumes
3. Leafy greens
4. Vegetables
5. Fruits
6. Nuts, Seeds, Herbs and other foods

4.2.1. Quick guide to plant selection

When compiling a list, try to get a relatively even spread of plants across the six food groups. There can be a lot of cross-over between these six groups, and often, different parts of the same plant will be useful for different nutrients. This is advantageous from a nutritional perspective, although it may make it more difficult to classify a plant as belonging to a particular group.

More detail is given in the following section, but as a rough rule of thumb, selection of plants based on the following guide will make a significant contribution to a nutritious, balanced diet:

1. Starchy staples – high energy

2. Legumes – high protein
3. Leafy greens – high iron, vitamin A
4. Vegetables – high vitamin A
5. Fruits – high energy, vitamin A, vitamin C, zinc
6. Nuts, Seeds, Herbs and other foods – high energy, iron, zinc

4.2.2. Starchy Staples

Starchy staples are primarily for energy, although some may also have useful quantities of vitamins and minerals. These foods include rice, wheat, maize, potato, cassava, millet, sorghum, sweet potato, taro, yam, sago, bananas (particularly plantain type), some pulse crops and many others. A little research will readily determine the major starchy staples that are being grown and consumed in any country. Sometimes what is favoured for consumption is not what grows best in that country. Western influence and cultural issues serve to modify behaviour in choosing what foods are included in the diet. Most developing countries with malnutrition issues are in the tropics. In this climate, cassava, sweet potato, yam and taro will invariably be important food plants. In places where bananas are native or well adapted, they can be an important source of starch. In some countries Western starchy foods are highly favoured, wheat and corn being notable examples. These may or may not grow well, but may also require high inputs. They are therefore of questionable merit for subsistence farmers with little income, and traditional crops would have much greater value.

4.2.3. Legumes

Pulses or legumes are a particularly important food group as they tend to have high protein levels. We normally think of pulses as the dried seeds of plants such as lentils, beans and peas. However, many other parts of the plant may also be edible and can have high levels of vitamins and minerals. Legumes are also valuable in sustaining soil fertility due to their ability to fix nitrogen. Legumes belong to the plant family Fabaceae, and can be readily selected from the database by searching using the family name.

4.2.4. Leafy greens

Leafy greens generally grow quickly, and need to be part of any diet. The darker the colour, the more likely they are to have high levels of nutrients. The database can be used to select leafy greens with the highest levels of key nutrients, particularly iron and vitamin A. Some leaves may be high in nutritional value but also be poisonous, requiring special treatment prior to consumption. A particular example is cassava leaves, which are quite high in many nutrients, but also have high levels of cyanide, which is very poisonous unless treated correctly, as is cassava root itself. Some countries have a culture of consuming cassava leaves while others do not. If a selection is made of leafy greens for a country, and sorted in turn for the highest levels of each nutrient, then some common plants will begin to emerge that have higher levels of a range of nutrients.

4.2.5. Vegetables

This group, commonly known as vegetables in Western countries, can contain a wide variety of plants such as greens, root crops, fruits etc. and contains many important food crops not covered under the other categories, including beets, cucurbits, bulbs and brassicas. Carrot is particularly valuable and has a higher level of provitamin A than almost any other plant. Beets are useful as the leaves can be eaten as a vegetable whilst the root and the leaves often have reasonable levels of provitamin A. Cucurbits are useful in many cultures with all parts of the plant being eaten, including the leaves, flowers and seeds. Onion leaves have greater nutritional value than the bulbs but the bulbs are a very useful

flavouring component and can also be stored. Brassica crops, such as savoy cabbage, cauliflower and particularly broccoli have good levels of provitamin A, although ballhead cabbage has low levels of nutrients. Ballhead cabbage can actually be deleterious to malnourished infants as it has sufficient bulk to satisfy hunger, and therefore reduce intake of other foods that could positively address malnutrition.

4.2.6. Fruit

Fruits are important sources of vitamins and minerals but can also be good energy foods. Some fruit, such as bananas, can be important as a starchy staple. Many fruits, such as tomatoes, eggplant, peppers and okra are often considered as vegetables more so than as fruits. Many fruit plants are trees or perennials, and once established, provide a regular supply of food. Fruit tends to be seasonal, so consideration needs to be given to including species with varying maturity times.

4.2.7. Nuts, Seeds, Herbs and other foods

This group is somewhat miscellaneous, but nonetheless important, as it will include plants that often have high levels of particular nutrients. The group includes herbs, nuts and seeds and other plants such as edible fungi, ferns, palms, and other tree crops. Many of these can be rich sources of micro-nutrients such as zinc and iron. Many plants have edible seeds which are often overlooked in Western diets. Examples include watermelon and pumpkin seeds, both of which are quite nutritious.

5. Special Notes

5.1. Common and commercial crops

The principle behind Food Plant Solutions is to encourage the use of local plants with high levels of nutrients. Some of these may be major agricultural crops that are already well known. Examples include:

- Rice
- Wheat
- Oats
- Maize/corn
- Mango
- Banana

There are others, but these serve as examples.

As a general principle, these types of plants should not be included in a field guide, as they are well known, and in some cases (e.g. corn), are relatively high input crops. The purpose of the Food Plants Solution project is to look beyond these types of crops, and focus on plants that are less well known and, as noted above, often have superior food value and lower input requirements. Some knowledge of the country's agriculture will be required to make a judgement on whether or not such crops should be included.

5.2. Flavouring foods

It is important to note that while some plants have extremely high levels of some nutrients, many of these are used as flavouring foods (condiments), and are generally used only in small amounts. Therefore, the nutritional contribution they make to the diet will be relatively small. Typical of these types of plants are garlic, chilli, ginger, spices, coriander, mustard, pepper, celery seed, fenegreek seed and saffron. Use of flavouring foods are normally very much part of local culture, and are very likely to be used anyway, so inclusion in field guides is unlikely to be an influence on changes to diet Once again, these should not be considered as major food sources. A few may be included in the *Nuts, Seeds, Herbs and other foods* section of the field guide.

5.3. Plants of special note

There are some plants that are worthy of special mention and probably need to be considered in any edible list, provided they occur in the country or region of interest. These are sweet potato (*Ipomoea batata*), the common potato (*Solanumn tuberosum*) and cassava (*Manihot esculenta)*. Both types of potatoes are very good sources of carbohydrate, and in the case of sweet potato, a useful source of vitamin A. Both are also sources of Vitamin C, which is unusual in most starchy vegetables.

The potato is a very efficient converter of energy into food and has excellent water use efficiency. It is easy to grow in poor soils. Coloured potatoes can also be a good source of vitamin A. Potatoes will grow in cooler regions than sweet potato, and although most are intolerant of frost, some species will tolerate light frosts. Potatoes generally will grow in poorer soils than sweet potatoes.

Neither of these types of potato are drought tolerant, so a reliable water supply is required for production. Both are being actively promoted as important sources of food in developing countries due to their many benefits.

Cassava grows widely in the tropics and is able to produce well on poorer soils. However, unlike potatoes and sweet potatoes, the roots have little food value other than as a starch source. While the root can be an important source of starch, the leaves are high in important vitamins and minerals.

6. Summary

The information provided in this document is not exhaustive, but is merely a guide to some of the issues to be considered when selecting plants for possible inclusion in a Field Guide of the most useful plants for a particular region or country.

When a list has been compiled, it will be sent to Food Plants Solutions for review. There may need to be adjustments to the list based on feedback from the review team. When the list has been finalised, the draft field guide will be assembled by Food Plants Solutions volunteers.

7. Appendix 1

Further information on the nutritional power of plants

Plants containing the required daily nutritional needs of children and adults can be easily grown in home or community gardens at very low cost. Decades of research show that many substances found in the plants we eat actively prevent disease and promote good health. The best way to ensure good nutrition is to eat a balanced diet which includes as wide a range of food groups as possible. If this can be achieved, good nutrition can be achieved without dietary supplements. Food Plant Solutions helps people understand the range of options available in selecting the food plants they choose to grow and harvest. The Food Plant Solutions objective is to not just create greater awareness of the vast wealth of edible plants that are adapted to grow in a particular country, but to also provide information on the nutritional value of each plant so this can be factored into decisions of what to grow.

There are many lesser known food plants with surprising and desirable nutritional value. To fully appreciate them, some basic nutritional knowledge is required. It is important to not only know which nutrients are essential, but what can happen if these nutrients are not supplied in full on a regular basis. Many health issues can be easily corrected by simply making the right dietary choices.

A quick overview of key components of nutrition follows.

7.1. Vitamins

Vitamins are organic compounds that are essential, in small quantities, for the normal functioning of metabolism in the body. They cannot usually be synthesized in the body but they occur naturally in certain foods. Vitamins are essential for human growth and development. They are also an important component of many metabolic activities.

- **Vitamin A** (or beta carotene) – present in red, orange or yellow vegetables like carrots and tomatoes, leafy green vegetables and some fruits.
- **B Vitamins** – this group of vitamins includes B1 (thiamin), B2 (riboflavin), B3 (niacin), B6 (pyridoxine), B12 (cyanocobalmin), folate, pantothenic acid and biotin. All the B vitamins except B12 occur in yeasts and whole cereals (especially wheat germ), nuts & seeds, pulses and green vegetables. Vitamin B12 is not present in plant foods. Only very tiny amounts of B12 are needed, and vegetarians usually get this from dairy produce and free range eggs. People who consume few animal foods are more likely to develop a deficiency of this vitamin.
- **Vitamin C** – fresh fruit, salad vegetables, all leafy green vegetables and potatoes.
- **Vitamin D** – Vitamin D is vital for good health, growth, strong bones, calcium absorption and immune function. The best source of vitamin D is UVB radiation from the sun which converts cholesterol in the skin into vitamin D. Fatty fish and fish liver oils are good sources, and in developed countries dairy products are often fortified with Vitamin D.
- **Vitamin E** – nuts, seeds, vegetable oil, wholegrain cereals.
- **Vitamin K** – fresh vegetables, particularly leafy greens, cereals and bacterial synthesis in the intestine.

7.2. Protein

Although many people in developed nations find it easy to get their daily requirement of protein from meat, poultry, fish, eggs and dairy products, people in developing nations with limited resources

sometimes find it difficult to locate and consume those sources of protein every day. Many edible plants contain protein. Examples of plants or plant-based products known to contain protein include:

- **Nuts** – hazel nuts, brazil nuts, almonds, cashews, walnuts, pine kernels
- **Seeds** – sesame, pumpkin, sunflower, linseed
- **Pulses** – peas, beans, lentils, peanuts
- **Grains/cereals** – especially wheat
- **Soya products** – tofu, tempeh, textured vegetable protein, soya milk

Proteins are made from amino acids, and in a mostly vegetarian diet, it is best to complement and balance amino acids by eating a variety of plant-based foods that contain proteins.

Few single plant foods contain all the essential amino acids in the right proportions, but when plant foods are mixed, a deficiency in one is likely to be covered by excess in another. It is common in human diets to mix protein foods. The human body naturally stores amino acids, so if one meal is deficient, it can be made up from the body's own stores. Because of this, people don't have to complement amino acids all the time, as long as their diet is varied and well-balanced.

7.3. Carbohydrates

Carbohydrates are the most important source of energy in human diets, and most of them are provided by plant foods. There are three main types – simple sugars, complex carbohydrates or starches, and dietary fibre.

The sugars, or simple carbohydrates, are found in fruit, milk and table sugar. Refined sources of sugar are best avoided as they provide energy without any associated fibre, vitamins or minerals and they are the cause of many health problems.

Complex carbohydrates are found in cereals/grains (e.g. bread, rice, pasta, oats, barley, millet, buckwheat, rye) and many root vegetables (e.g. taro, cassava, yams, sweet potatoes, white potatoes, parsnips). A healthy diet should contain plenty of these starchy foods as there is evidence a high intake of complex carbohydrate benefits health. The unrefined carbohydrates, like whole meal bread and brown rice, are best of all because they contain essential dietary fibre and B vitamins. The World Health Organization recommends that 50 - 70 % of energy should come from complex carbohydrates. Starchy foods are very filling relative to the number of calories they contain.

7.4. Minerals

Minerals are non-organic substances essential for good health. A quick overview of the key essential minerals that people need on a regular basis follows:

- **Calcium** – important for healthy bones and teeth. Found in dairy products, leafy green vegetables, bread, tap water in hard water areas, nuts and seeds (especially sesame seeds), dried fruits. Vitamin D helps absorption of calcium.
- **Iron** – needed for red blood cells. Found in leafy green vegetables, wholemeal bread, molasses, eggs, dried fruits (especially apricots and figs), lentils and pulses. Vegetable sources of iron are not as easily absorbed as animal sources, but a good intake of vitamin C will enhance absorption.
- **Zinc** – plays a major role in many enzyme reactions and the immune system. Deficiency in children can lead to physical and mental retardation. Found in green vegetables, cheese, many seeds including sesame and pumpkin seeds, lentils and wholegrain cereals. Water melon seeds are a rich source of this mineral that is often overlooked.

- **Iodine** – present in vegetables, but the quantity depends on how rich the soil is in iodine. Dairy products and sea vegetables are good sources of iodine. Iodine deficiency can lead to problems with the thyroid gland and, in severe cases, causes mental retardation.

8. Appendix 2

8.1. Dealing with the Zinc bug

If the iron and zinc data in the Food Value table are the same, you will need to go back to the database and validate the correct zinc value. A case in point is coconut milk (Fig 1, below). This is done by the following process:

- Open the database menu and click on the "Find Plants by nutritional values" option
- In the Iron box (see Fig. 1.) type in values which bracket the iron value for the plant part of interest. For example, for coconut milk (Fig. 1), type in 1.2. The search will reveal the view in (Fig. 2). The advantage of bracketing the value is that sometimes an exact match won't find the plant in question due to rounding of values.

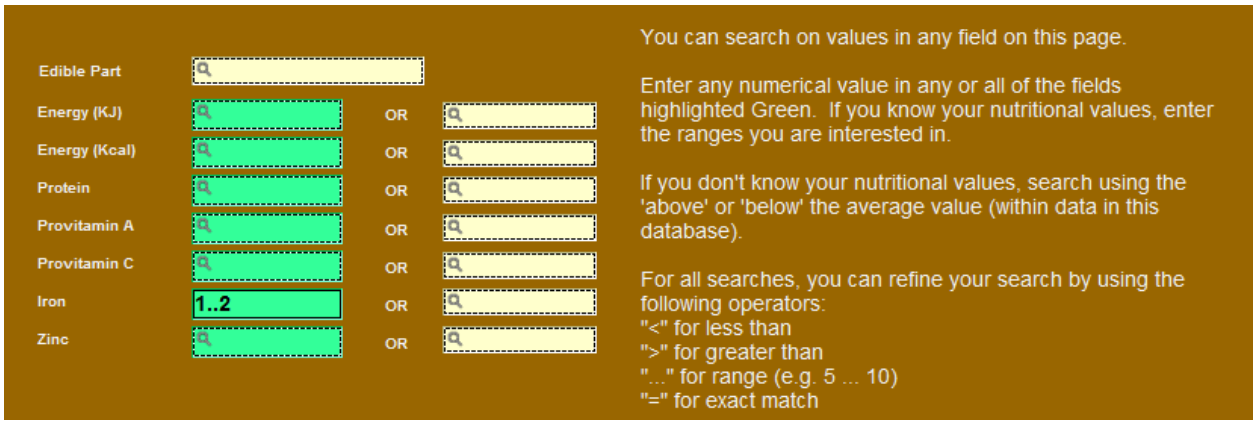

Fig. 1. View of search function looking for Iron values 1.2.

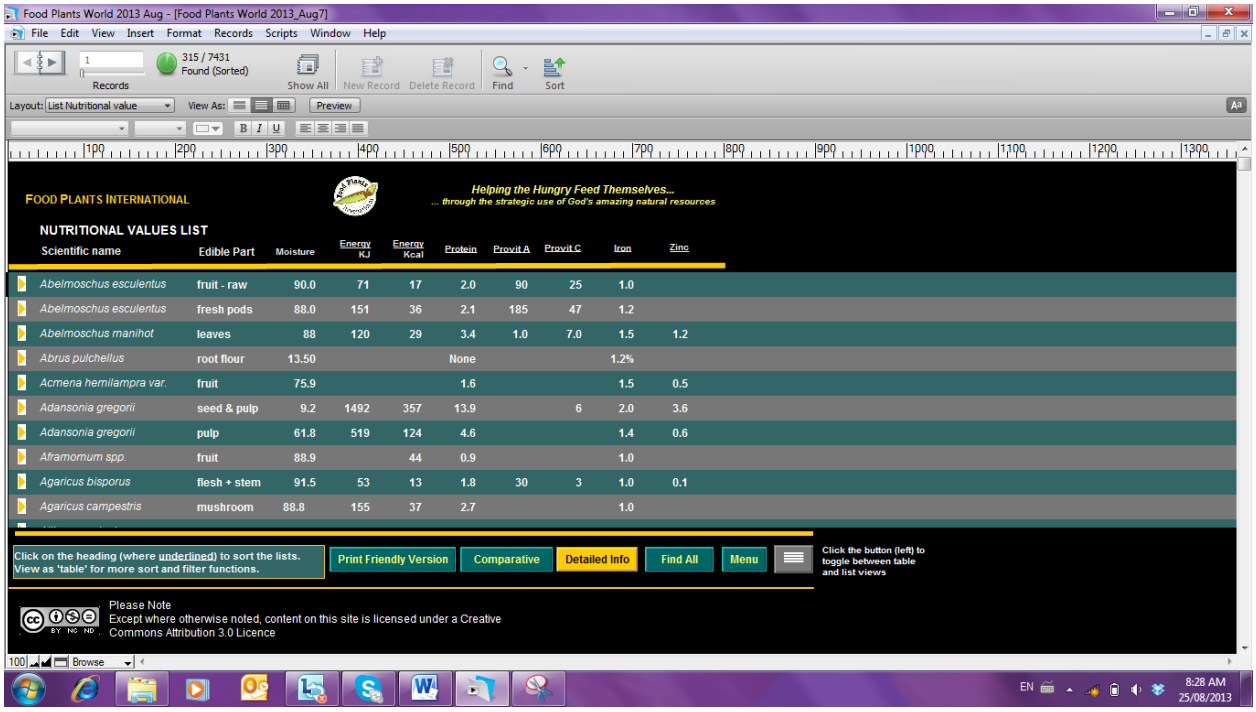

Fig. 2. View of search results for Iron values 1.2.

- Click on the Scientific name heading to ensure the list is in alphabetical order.
- Scroll down the list until *Cocus nucifera* is found.
- The nutrient listing will display the correct zinc value, which can now be entered into the Food Value table.
- On some occasions you will find that the iron and zinc levels are actually the same, but you can only be sure of this by checking back through the database using the process outlined above.

Efforts are underway to resolve this bug, but it is proving problematic.