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

Exploring and implementing a Food Plant Solutions program in a new country or region

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1. Introduction

Food Plant Solutions Rotarian Action Group has been developed to address hunger, malnutrition and food security in countries or regions in need. By "unlocking" information on local foods, immense food resources can be made available and in the process:

- children who would otherwise die due to malnutrition will have a chance to live
- children who would otherwise be blind due to lack of vitamin A may see clearly
- food security can be significantly enhanced
- costly food imports can be reduced
- nutritionally related diseases that impair growth, cause physical and intellectual disability and needlessly reduce quality of life can be reduced or eliminated

This document has been developed to assist those interested in exploring the potential of a Food Plant Solutions program in a region of interest, and provides suggestions on how to implement such a program. It assumes a reasonable understanding of the Food Plant Solutions concept, but a concise overview is provided. Interested parties may already be engaged in projects in the region of interest and, having observed that nutrition and food supply are important issues, may wish to extend their activities into this area.

2. Background

2.1. The problem

As global population grows beyond 7 billion, the number of people in developing countries going to bed hungry every day is approaching 1 billion, and increasing. Western food-aid programs are failing to address this problem, yet the paradigms that help perpetuate this failure persist. While direct aid is essential in acute food shortages, sustainable food security must involve self-help.

Western food aid programs focus on Western food crops that often do not grow well, as they are poorly adapted or unsuitable for developing countries. They usually require high-cost inputs, that people earning less than $2 per day cannot afford, and which inadequate supply logistics cannot deliver. They often cannot be produced sustainably, and more often than not, lack the key nutrients required to prevent malnutrition in the target countries.

2.2. The Solution - Food Plants International Database

Tasmanian agricultural scientist, Bruce French, conceived a solution to address this problem by unlocking the resources available in local food plants. Whether they are native or introduced, by their very occurrence, local plants demonstrate their adaptation to the prevailing environment, including pest and disease pressures. Those that are well adapted thrive naturally, without the need for costly inputs such as seed, fertilizers and chemicals. Many such plants are edible, and if those with the highest levels of nutrients missing from the diet can be identified and cultivated, then significant potential exists to sustainably address malnutrition in developing nations. The only element missing from making this possibility a reality is a lack of information that would encourage people to incorporate relevant food plants into their production systems and diets.

There is little doubt that much knowledge exists in every developing country on which plants are edible and which ones are not. However, much of this traditional information is being lost for two main reasons:

- Little has been written, and often few, if any books, are available on the significant number of potential plants that could be incorporated into the diet.

- Western influence over a considerable period has meant that higher importance has been placed on non-traditional species, and in the process, traditional food plants have been displaced from the diet.

At the same time, it has become apparent that while there may be a good understanding of what is edible and what is not, there appears to be a profound lack of understanding by both indigenous people and Western aid providers as to the nutritional value of most food plants. As a result, many typical diets are satisfying hunger but may be exacerbating malnutrition.

Recognising these issues, Bruce French set out on a personal quest nearly 40 years ago to create the largest database of edible plants that has ever been developed. He subsequently formed the non-profit organisation, Food Plants International. The database currently contains information on more than 24,000 plants from all countries of the world, including names, description, occurrence, production information, edible parts, pictures and references. Most importantly, information on the food value for many of these plants is included. What was a simple and good idea is therefore now a real possibility.

2.3. Food Plant Solutions

Food Plant Solutions was developed by the Rotary Club of Devonport North, Rotary District 9830 and Food Plants International, to help create awareness of this solution and encourage its application. Rotary regularly engages in aid programs in developing countries, and one objective is to ensure a Food Plant Solutions approach is incorporated into these projects.

Food Plant Solutions doesn't fit easily into the framework of current aid programs. It is part education, part agricultural practices, part nutrition and health, part about interactions with indigenous cultures, and part household economics. It often defies simple explanation due to longstanding misconceptions about the nature and design of contemporary aid projects, chief being the western preference for highly structured and detailed plans involving the introduction of imported technologies. The project's simple message, though sometimes misunderstood, is easily grasped by locals familiar with their local resources. Food Plant Solutions involves the dissemination of information designed to help different cultures prioritize their foods according to the nutritional, economic and environmental impacts on themselves, their communities and their natural resources. It gives information on readily available local foods which are often either overlooked, underutilized or dismissed, in favour of solutions that are more convenient and easily understood by aid providers, if not necessarily the people receiving the aid.

The primary intention of Food Plant Solutions is to create healthier dietary habits using low input agricultural practices and a wide variety of locally adapted, nutritious food plants through the dissemination of information through community networks. Food Plant Solutions is not attempting to introduce new technologies, or proposals to modernize or streamline current food production systems. It seeks to use existing networks to deliver its message, so broad networking within existing groups and organisations provides the best avenue for success.

The many government organisations and NGOs from developed nations that provide food aid should not only be aware of the existence of this solution and its potential, but encourage its incorporation into existing and new programs. This concept has real potential, and has become widely recognised by those who have the technical knowledge to understand its significance. If it fails to achieve recognition by major aid providers, the current ineffective paradigms will only be perpetuated. It is therefore vital that all organisations facilitating or delivering food aid consider the technical merit and significance of the information resource that has been created by Food Plants International, and the program approach developed by Food Plant Solutions.

2.4. The potential of Food Plant Solutions

Food Plant Solutions has the potential to positively impact a number of areas of concern in developing countries.

2.4.1. Human health and nutrition

The objective of raising awareness of the nutritional values of locally adapted edible plants is to encourage people to grow a variety of plants that will meet more of their daily nutritional needs. In doing so, many common diseases related to poor nutrition may be reduced or eradicated.

2.4.2. Food security

Regularity of food supply is an important issue, and the source of the major part of the food supply is a dimension of this. Some regions rely heavily on imported food, which impacts not only the economy of the country or region, but also the finances of a typical family. Poverty may prevent purchase of the nutritionally most appropriate food, or food in sufficient amounts, leading to occasional, or chronic, under-nutrition. Circumstance could also prevent supply of imported food sources through critical periods.

Food grown and sourced locally can be affected by seasonal, climatic, environmental, pest or disease events that give rise to shortfalls in supply. Such situations commonly predispose to hunger and malnutrition. Increasing knowledge of local food plants that can form the major part of the diet can help ensure that supplies of essential foods are sustainably available at all times of the year, every year. The best way to ensure food security is to grow a wide range of food plants. It is likely that some plants are able to survive adverse conditions better than others and growing a range of food plants will usually mean plants are maturing at different times, all helping to ensure sustainable food supply.

2.4.3. Economic and environmental Impact

By using plants with high nutritional value, low impact on natural resources and low requirements for purchased and/or imported resources, people will be better off economically, both individually and as a community. They will be less likely to deplete their natural resources and be better able to pass those resources on to future generations. They will also be able to use their finances for items other than food, such as education, and therefore be able to improve their quality of life.

2.4.4. Community and cultural pride

The project intentionally focuses on one aspect of a community's unique natural heritage – its food plants. Alongside the nutritional and economic benefits of growing locally adapted plants, many of these plants are proudly featured in local cuisine and deeply embedded in local culture.

3. How to determine need for a Food Plant Solutions program

There are many indicators of need - some are obvious, others less so. From existing experience in the country or region in question, it may be obvious that hunger and malnutrition are widespread, and local people are desperately in need of assistance in overcoming problems of food supply. The following examples provide possible indicators to confirm and quantify the need. Some or all of these indicators, and others, may reinforce and confirm a need and the potential value of implementing a Food Plant Solutions program to address that need.

3.1. Infant mortality

Statistics on infant mortality (to age one), and child mortality (to age five) are available for most countries. Infant and child mortality are closely correlated with malnutrition provide a prime indicator of the nutritional status of the country. The most critical period for nutrition in infants is between conception and two years of age. If nutrition is not adequate during this period, children

can be permanently physically, mentally and/or visually retarded. Therefore maternal, infant and child nutrition are the most critical issues.

The global average for infant mortality is around 50 per 1000 births, so any country approaching or exceeding this number can be considered a priority. Similarly with child mortality - the global average is approaching 70 per 1000 births, so this figure provides another convenient threshold for indicating priority.

3.2. Malnutrition

Protein-energy under-nutrition (PEU) is due to chronic deficiency of all macronutrients. It also commonly includes deficiencies of many micronutrients. PEU can be sudden and total (starvation) or gradual. Severity ranges from subclinical deficiencies, to obvious wasting (with oedema, hair loss and skin atrophy) to starvation. Multiple organ systems are often impaired.

In developed countries, PEU is common among the institutionalized elderly (although often not suspected), and among patients with disorders that decrease appetite or impair nutrient digestion, absorption, or metabolism. In developing countries, PEU affects children who do not consume enough calories or protein.

Primary PEU is caused by inadequate nutrient intake. In children, chronic primary PEU has two common forms - marasmus and kwashiorkor. The form present depends on the balance of non-protein and protein sources of energy. Starvation is an acute, severe form of primary PEU.

Marasmus causes weight loss and depletion of fat and muscle. In developing countries, marasmus is the most common form of PEU in children.

Kwashiorkor is associated with premature abandonment of breastfeeding, which typically occurs when a younger sibling is born, displacing the older child from the breast. Children with kwashiorkor tend to be older than those with marasmus. Kwashiorkor may also result from an acute illness, such as gastroenteritis or another infection, in a child who already has PEU. A diet that is more deficient in protein than energy may be more likely to cause kwashiorkor than marasmus. Less common than marasmus, kwashiorkor tends to be confined to specific parts of the world, such as rural Africa, the Caribbean, and the Pacific islands. In these areas, staple foods (e.g., yams, cassavas, sweet potatoes, green bananas) are low in protein and high in carbohydrates. In kwashiorkor, cell membranes leak, resulting in peripheral oedema.

3.3. Blindness

Vitamin A is essential for the functioning of the immune system. Its lack can lead to irreversible blindness. More than 250,000 children become blind each year due to vitamin A deficiency. But before that, a child deficient in vitamin A faces a 25 per cent greater risk of dying from common ailments, such as measles, malaria or diarrhoea. Night blindness is one of the first signs of vitamin A deficiency. More severe deficiency results in transient and permanent blindness, increased childhood morbidity and mortality, and maternal mortality. Improving the vitamin A status of pre-school age children in developing countries can reduce childhood mortality by up to 50%.

3.4. Anaemia

Iron deficiency is the most common and widespread nutritional disorder in the world and affects a large number of children and women in developing countries. Over 30% of the world's population are anaemic, many due to iron deficiency, and in resource-poor areas, this is frequently made worse by infectious diseases. Malaria, HIV/AIDS, hookworm infestation, schistosomiasis, and other infections such as tuberculosis, are particularly important factors contributing to the high prevalence of anaemia in some areas.

Iron deficiency affects more people than any other condition, constituting a public health condition of epidemic proportions. More subtle in its manifestations than, for example, protein-energy malnutrition, the impact of iron deficiency is ill-health, premature death and lost earnings.

Iron deficiency and anaemia reduce the work capacity of individuals and entire populations, bringing serious economic consequences and obstacles to national development. Overall, it is the most vulnerable, the poorest and the least educated who are disproportionately affected by iron deficiency, and it is they who stand to gain the most by its reduction.

3.5. Impaired Growth

Zinc deficiency is the fifth leading risk factor for disease in the developing world. It is a functionally essential component of more than 100 enzymes, involving all metabolic pathways, has a fundamental role in gene replication and function, mediates the activity of growth hormone and supports immune function. Zinc deficiency is characterized by growth retardation, loss of appetite, and impaired immune function.

Zinc is not only essential, but because it is involved in so many important processes, may even be "first" limiting. This means it may be the critical limiting factor in the diet. Zinc is especially needed in times of rapid growth and is therefore a particularly important nutrient for infants and young children. Zinc deficiency has been widely attributed to causing impaired growth in children resulting in irreversible physical retardation.

3.6. Intellectual Disabilities

Eighteen million children per year are born with impaired mental abilities due to iodine deficiency. Nearly two billion individuals have insufficient iodine in their diets, including one third of all school age children. Populations with chronic iodine deficiency have increased levels of mental impairment.

Iodine is an essential mineral for human development and growth, and is needed to produce the hormones that regulate the thyroid gland. The most commonly known sign of iodine deficiency is goitre, the swelling of the thyroid gland in the neck. Iodine deficiency primarily affects the developing brain.

4. Identifying key nutritional issues in the population

The local population may be hungry and/or malnourished, in obvious need and asking for help. Experience with an existing project may have created awareness of a need to address hunger or malnutrition and prompted action.

Statistics may be available from surveys of the population which indicate the level of nutrients in the population important to health and wellbeing. Information may be available on nutritionally related diseases or specific disorders that commonly occur in the population. Such information will help confirm and quantify the need, and will also provide valuable information on where to focus. The UN website is a good source of information.

Government agencies involved with health, children, mothers, education and agriculture are normally prime sources of such information. An existing aid community is also a prime indicator of need and a good source of information. It is therefore a good idea to communicate with personnel involved with Non-Government Organisations and existing aid projects. Other potential sources of information include community organisations, women's groups and missions. There may be many others.

The most important information to determine is the key nutrients missing from the diet and those giving rise to nutritional related disorders in the population.

5. Investigating the typical diet

Having determined the important nutritional issues giving rise to malnutrition, it is important to understand what key nutrients are present in the normal diet of the people in the region. Most established populations have developed with a source of carbohydrate-rich energy food, a starchy staple, available to sustain the population. This may be rice, corn, wheat, millet, sweet potato, taro, yam, breadfruit, banana or one of many others. Other plant or animal foods will be added to expand the diet. It is useful to understand what other plant foods are commonly included in the diet and what nutrient value they contain. Many of the starchy staples are quite low in protein and other essential nutrients. In some cases, they are quite abundant, and are used to satisfy hunger, while at the same time exacerbating malnutrition. Agricultural ministries in many countries and the FAO are good sources of information.

Animal products and fish are good sources of protein and normally have good levels of many essential nutrients that help prevent malnutrition. If animal products make up part of the diet, it is important to understand how often they are used and what amount is consumed.

Investigation of the typical diet will determine the likely levels of key nutrients present and what may be lacking. This will help determine whether it is worthwhile considering the availability of local food plants, and the key nutrients that should be considered when selecting possible locally occurring plants for inclusion in the diet.

6. Historical and cultural influences on the typical diet

History and culture are key factors in the development of the foods that make up the typical diet in any country or region. The prevailing environment may have changed the traditional diet over time. Animal products may have traditionally formed a major part of the diet, but population growth and depletion of resources may restrict their use in some places. The same has often occurred with many foods harvested from the wild. Such issues have forced change.

In other cases, traditional foods have been gradually dropped from diets due to the influence of introduced western foods, preferred because they are seen as more civilised, sophisticated or (often erroneously) nutritious. In some situations, eating such foods is seen to confer an elevated status. Western diets are made up of a wide range of foods and normally include a range of animal products. For this reason, malnutrition is rare in a western developed society. However, the plant food sometimes commonly included in western diets may be quite low in essential nutrients. Common examples of foods introduced into developing countries that have relatively low nutrient value include ballhead cabbage, lettuce, tomato and onions. In some cases, traditional local food plants are being replaced by foods that do not address local dietary needs.

Food habits are deeply ingrained in any culture and will not be readily changed. As traditional foods are lost from local diets, key information about them is also lost. Re-discovering their heritage and immense nutritional value can help raise interest in these foods. This can be further enhanced if people know that incorporating local foods into their diet can improve their babies' health, avoid blindness, promote energy and wellbeing and provide more disposable income. Therefore, it is very important that the information in the Food Plants International database is made more readily available through programs such as Food Plant Solutions.

7. Implementation of a Food Plant Solutions program

7.1. Introduction

There is no one way or best way to establish a Food Plant Solutions program in a new country or region. A suggested approach is described based on the experience gained from the project to

date. Implementation of a program cannot begin until prior investigation has identified hunger, malnutrition or food security (or all three) as issues in the target country or region.

Like many projects, the more effort put into Food Plant Solutions, the more likely it will achieve a meaningful outcome, and the more likely the intended audience will be receptive to the project. Flexibility is suggested in setting expectations. This guide has been prepared to assist preparation of a Food Plant Solutions program, but there is a lot of room for individual creativity in implementation. What worked in one program may not work in the next. The possibilities and opportunities are limitless, so keep an open mind to original and innovative ideas.

7.2. The Challenge

The best approach to solve any challenge is to begin with the end in mind. The ultimate goal of a Food Plant Solutions program is to achieve improved nutritional health for affected communities, particularly for child bearing women and infants.

People and children in affected regions will not benefit from the Food Plant Solutions approach unless the high nutritional value of local food plants is recognised and understood, and consumption is increased by incorporation in the daily diet. This may require significant change, which is rarely easy to achieve. The greater the number of people who make the change and engage in greater use of local food plants, the greater will be the outcome.

The ultimate indicator of success is reduced infant and child mortality, although there are other useful indicators. Awareness is the first step, but adoption on a wide scale is critical to success. The challenge is to effect change, and there is no universal formula to achieve this. Each country and community will have different cultures and values, and these issues must be factored into the implementation program to achieve success.

7.3. Local interest and engagement

While the science of Food Plant Solutions is self-explanatory, the importance of establishing long-term relationships with people at potential program sites is essential, and perhaps less well understood. Exploring and researching the issues outlined in Sections 3 – 6 will establish whether the region of interest would benefit from a Food Plant Solutions program. During this process, it is likely contact has been made with a range of local people and organisations with an interest in malnutrition and food security, who may not only help confirm the need, but may also have an interest in further collaboration. In the development of any new program, it is particularly useful to establish contact with a local organisation or group with an interest and commitment to engage in development of a program. This is a particularly important precursor to success.

Local educators, community leaders, and government and non-government organisations, will be key people to help deliver the message and content of Food Plant Solutions within their own country. It is suggested the prime focus should be to act as an ambassador for the Food Plant Solutions project and effectively communicate the content and value of Food Plant Solutions information to local people in the best position to disseminate it. They will more than likely be people who are already involved in providing education or essential services to communities. They are likely to be locally known, respected, and more readily available to the end users than a non-local. They will already be immersed in the local culture, and hence better able to judge how to effectively deliver the information.

Because every country and every culture is different, there is no single way to deliver the information Food Plant Solutions offers. It is important that volunteers not make assumptions about the locals in the project's target country, and remain non-judgmental and open-minded when working with potential program partners. Local people will have far greater knowledge and

understanding of local foods that anyone from outside the country is ever likely to know. Volunteers will need to hone their cross-cultural communication skills and enlist the aid of key people in the areas they hope to target, especially if there are differences in language. Though volunteers themselves do not need to have expertise in all Food Plant Solutions subject matter, they will need to know and be able to easily converse about key concepts. It is suggested that volunteers do some background research on the countries and cultures they are targeting.

Teams are encouraged to approach a wide range of delivery channels so the program is less likely to become identified with one person or one group. It is rare to know exactly where the best allies and supporters may lie, so it is important that the team doesn't show preference for one particular individual or organization.

The goal is to empower local people to deliver the message. Empowerment does not occur unless the program team members are willing to entrust locals with the ability to make delivery on their own. Providing the information in formats that locals can easily adapt to the needs of their target audience is a big help in this area.

Ideally the project should be requested or developed locally, and handed over to local people at an appropriate time. When a project has been handed over it is important to maintain interest and support, and keep communication channels open, but avoid micromanaging the project.

8. Overview of a plan for program implementation

8.1. Introduction

It is considered imperative that a local group or team be formed to guide and manage implementation. Ideally such a group will be formed before any decision is made to undertake a program and will involve individuals with a range of skills and experience. The "AIDA" strategy has been adopted as an appropriate strategy for a Food Plant Solutions program, described by - **A**wareness → **I**nterest → **D**esire → **A**ction. This is the normal pathway of change, and applies equally to the core group who choose to undertake a program as it does to the ultimate target audience of a program.

8.1.1. Awareness

The first step is to raise awareness in the targeted audience. This may take many forms, such as public service announcements, advertisements, or informational talks. Experience to date indicates that with the challenges of language, culture and technological understanding, the best way to raise awareness is to have something to show. Simple information with pictures and graphics has proven to be most effective. It is best to target particular audiences rather than a broadcast approach.

When raising awareness, it is important that all team members are able to simply and clearly state the purpose and mission of Food Plant Solutions. Engaging with the local audience is important to determine how potential stakeholders might see the information being used and if they know of other people or groups who might also be able interested.

Obvious places to start are established instructional institutions such as schools or community training centres, agricultural schools or extension services, and government departments. It is important to establish contact with a person in a position to make or influence decisions. As the project crosses over the disciplines of health, education, agriculture, home economics and nutrition, it is important to include a number of local groups in any proposed program.

Approach key individuals in organizations or networks who:

- might find benefit in disseminating Food Plant Solutions information, and

- would have a platform of some kind to disseminate the information if it was made available to them

Likely prospects could include:

- Existing aid projects
- Government organizations
- Non-government organizations
- Agricultural training centres
- Community based training centres
- International AID agencies
- Church groups
- Schools of all levels
- Higher education institutions
- Women's Groups
- Seniors' Groups
- Youth Groups
- Men's Groups
- Home economics forums
- Civic groups
- Local service clubs including, but not limited to, Rotary Clubs

8.1.2. Interest

If awareness has been achieved in a culturally and/or personally relevant manner, then interest is likely to follow. Interest cannot occur without awareness, but it will not be generated unless the target audience receives or is exposed to the message and more importantly can understand it. If interest is not generated it may mean the message has either not been received or is not seen as relevant. The options then are to consider an alternative form of delivery or seek a new target.

A possible approach is to identify which parties show an interest in Food Plant Solutions information. Create a platform for further correspondence with the parties who express interest. It is important to collect names and contact information as soon as interest is shown. At a minimum, interested parties should be given contact information for key members of your team, and the Food Plant Solutions web address www.foodplantsolutions.org . Any special skills of the interested parties that would be helpful in program implementation should be noted for future reference.

8.1.3. Desire

Desire will be created when interested parties have received the message, understand it and see it as relevant to them or people they care about. This will be demonstrated by an expressed intention or a proactive response. It is particularly advantageous if parties demonstrating a desire to engage are able to outline detailed, specific visions for their intended application of the program, (such as specific audiences, venues, and delivery methods), or why certain audiences will find the information beneficial. The more specific the vision and benefits articulated by interested parties, the greater the likelihood the concept will be adopted within their networks. It is particularly important to encourage local ownership and involvement while avoiding actions that may be interpreted as arrogant or culturally insensitive. Implementation team members should pay special attention to comments and feedback and seek to enhance the exchange of information and ideas.

8.1.4. Action

Desire is likely to translate into action if there is recognition of the need and that the solution is relevant. At the same time, individuals are unlikely to act unless they believe the outcome they seek is achievable. Therefore, scale, simplicity and clarity of implementation programs are important in helping people understand and determine in their own mind that what is being proposed is logical and achievable. Individuals are also more likely to be compelled to act if there

is some reward for them. This may be alleviation of pain or stress, generation of wellbeing, elimination of a problem or just self-satisfaction. Whatever the compulsion, action is unlikely to occur without the steps referred to, so it is valuable to keep these in mind in the implementation process.

An action plan for implementation should be developed and compiled into an agreed format. Information specific to the location is essential, and in-country partners should collaborate on the design of materials intended for use in that country or region. It will be necessary to establish how the development and production of materials will be funded. Many funding sources are available, but are likely to require detailed action plans, including information on how funds will be spent.

Once implementation has commenced, regular publicity is an ideal way to increase awareness and expand the reach of the program. It is a good idea to establish a relationship with local media. A public launch can be a good way to extend the message through all levels of the community.

9. Establishing an Implementation Group

An implementation program is more likely to be successful if there is a group or organization in the country that is ready, willing and able to be actively involved in leading and managing the program. The group, whether part of an existing organization or not, should include individuals who understand the problem and see the merit in the solution on offer. As outlined earlier, during the process of investigating the need for a Food Plant Solutions program, contact will have been made with a range of individuals and organizations with an interest in malnutrition and food security in the region, and who have an interest in further collaboration. Such contacts represent an ideal starting point to establish the group, which should include indigenous people, and particularly individuals with experience in aid programs, education, agricultural production, agricultural extension, health and nutrition. Where possible, representatives from government ministries, NGOs, community groups and media should also be considered. Such people will have established infrastructure, resources and networks which will be a great help to the program.

In development of the implementation group, consideration should be given to who will deliver the information and instruction, what funding may be required and where it can be sourced. Prior to commencement, groups may consider it appropriate to develop or source quantitative baseline data relevant to the program. This could include data on infant and child mortality, nutritional profiles in different sectors of the population, data on nutritionally related disorders and information on typical diets, all of which would provide useful benchmarks for future evaluation of the program.

10. Where to start

An initial approach may be the addition of a Food Plant Solutions component to an existing project, or running a pilot program associated with an existing project. A pilot program may involve the development of a model farm or gardens which focus on growing local food plants and sustainable growing practices. It could also take the form of small special interest groups in local communities. Having identified a need and an established network through which to extend or disseminate information, it may be considered appropriate to undertake a larger program on a wider scale. With appropriate expertise, the implementation group will be well positioned to consider and judge what is most appropriate.

Irrespective of the strategy developed, it will be necessary to determine at an early stage the most appropriate local plants for inclusion in the program. This is best decided by local people with appropriate knowledge and expertise. The Food Plants International database developed by Bruce

French, which is the information resource that underpins Food Plant Solutions, is available for this purpose. The complete database can be supplied on disc, so with a computer and some basic instruction, anyone can readily access the known food plants of any country and begin the process of selection. This is the most desirable approach, because it ensures local knowledge and ownership. As a practical alternative, the development of a field guide of potentially important food plants is a very effective way to create awareness and understanding of the database and how it can be used. It may also provide the basis for the development of specific extension materials to communicate the message.

11. Development of a Field Guide of Potentially Important Food Plants

Food Plant Solutions has established a procedure to develop field guides for countries or regions in need as a basis to increase awareness of what the project has to offer and to provide basic materials to support the development of an on location program. A number of documents, available for download from the Food Plant Solutions website, have been prepared to assist with this process. The relevant documents are:

- G3 Using the Food Plants International Database
- G4 Selecting potentially important plants for inclusion in a Field Guide
- G5 Producing a draft food plants field guide from the Food Plants International database
- G6 Generic Food Plant Solutions field guide template
- G7 - Edible part graph template

The field guide is intended to indicate some potentially important food plants that serve as examples to create interest and improve understanding of the important local food plants of the country of region.

The database contains comprehensive information on food plants for all countries, and search facilities allow anyone, whether familiar with the country of interest or not, to find and extract information for the preparation a draft field guide. Searches can be defined by country, food group, nutritional information (where this is known) and geographical criteria.

Extraction of information from the database is not difficult, but does require training to become familiar with its functionality. When there is interest in proceeding with a new program, the Food Plant Solutions project team has undertaken to appoint a specific Technical Support Specialist (TSS) for each target country. It is best where possible to identify such a person from within the target country, although if this is not possible, the TSS can be on individual from outside the country. This means that the TSS may be largely unfamiliar with the country, although each is encouraged to undertake some basic research to help their understanding of the country, its climate, geography, the major staples in the diet etc. so they become somewhat familiar with the subject matter. For each TSS, Food Plant Solutions provides training and support materials in the use of the database and development of the field guide.

In the process of developing the field guide, five to seven plants are selected for each of the key food groups. These include starchy staples (energy), leafy greens (vitamin A and iron), legumes (protein and soil benefits), vegetables (general nutrients and fibre), fruit (general nutrients and fibre) and others, including nuts and seeds (general nutrients). The plants are generally chosen on their nutritive contribution to overcoming malnutrition. On completion, a draft field guide will include about forty potentially important plants as a focus for a project group. It also includes basic information on human nutrition and good agricultural or gardening practice.

If a draft field guide has been developed by a TSS from outside the target country of interest, it is essential that the next step is validation of the information by a local specialist or organization from within the country. This will determine whether the selected plants are appropriate for the target audience. This may lead to some changes in the plant selection. The agronomic and food production expertise for this in-country review is likely to be found in universities, agricultural colleges and government agricultural ministries.

An important aspect to be considered is variation between different geographic regions within a country or region that may require separate field guides. The database allows searches based on bioregion, which includes both terrain and climate type.

The draft field guide will cover a selection of plants with an enhanced nutritional profile and which are naturally adapted to the target country. Such plants are likely to be able to cope with the prevailing climate, pests and diseases and are thus more likely to survive adverse conditions. Each field guide, which bears the title "Potentially Important Food Plants of…….", becomes a simple reference to help guide the focus of the implementation program, and to help local people better understand the value of local food plants. This draft is the first step in the process and should be seen as providing a basis for discussion.

Comprehensive details on the production of a draft field guide are provided in the document Assembling a Food Plant Solutions Field Guide, which should be read and used in conjunction with the Generic Food Plant Solutions field guide template and the Edible part graph template.

As they are developed, completed field guides will be posted on the website as a freely available resource for individuals, groups or organisations with a genuine interest in providing humanitarian aid to the country concerned. Implementation groups are requested to note this requirement. It should also be noted it is the intention of Food Plant Solutions to facilitate contact between independent parties with a shared interest in addressing malnutrition in a target country.

12. Extending the Message

When the field guide is complete, because it is in digital form, it can be readily translated into other languages appropriate to the country or region. Use of the field guide template makes the finished product suitable for printing, so the field guide can be published in volume if this is considered appropriate as part of the program.

While the field guide is a valuable resource in its own right, the information it contains provides useful information to develop other documents to aid in extension. Example documents have been developed by Food Plant Solutions and are available on the project website. Such documents can be provided in digital form and used as a model to develop similar documents for a different country or region. These documents rely heavily on pictures and simple information to help overcome the challenges of communication. As new programs are undertaken, it is anticipated that similar documents will be developed which can also be used as models.

Publication of field guides and extension documents will require funding, so a funding source will need to be identified by the implementation group. Food Plant Solutions Rotarian Action Group has an established network within the Rotary International community, and support may be identified through this network, either as sponsorship or through matched grants from The Rotary Foundation. Implementation groups are invited to explore this possibility.

Extension requires much more than distributing printed information. The extension channels developed are likely to be very experienced in conducting training, workshops and activities that would serve to support dissemination of the message. Ideally, this will draw heavily on the

experience and expertise of local extension specialists. It may also be possible to include a level of involvement by the TSS, provided the individual concerned is willing and able. This is an issue that needs to be explored between the parties independently.

At the same time it is important to identify appropriate extension partners, such as the list provided in Section 8.1.1. Involvement with schools at all levels is considered particularly valuable. If children can learn about and value their own local food plants from an early age, they are more likely to understand and use them as they get older. School programs that involve children in growing plants and developing gardens have proven very successful in many countries.

13. Communication

Once the extension program has commenced, regular publicity is an ideal way to increase awareness and expand the reach of the program. A good relationship with local media is very useful. A public launch can be a good way to extend the message through all levels of the community. Communication with all relevant government ministries and educational institutions is particularly encouraged. This will help ensure appropriate recognition by the government and the community for the program and its value. It may also help attract other parties with a common interest in the target country.

14. Conduct

A Protocol for Engagement has been developed by Food Plant Solutions to guide all parties involved in the development and delivery of programs. This document, available from the website, highlights the need for good governance in the conduct of all activities, and that all parties act at all times with due respect to the countries, the people and the cultures of all involved. In accepting any information, materials or support from Food Plant Solutions, all parties acknowledge this is conditional on their strict adherence to the Protocol for Engagement.

15. Further information

- Food Plant Solutions website www.foodplantsolutions.org
- G3 Using the Food Plants International Database
- Food Plant Solutions Protocol for Engagement
- G3 Using the Food Plants International Database
- G4 Selecting potentially important plants for inclusion in a Field Guide
- Maximising the Nutritional Impact of Food Security and Livelihoods Interventions – a manual for field workers-

  http://www.actionagainsthunger.org/sites/default/files/publications/maximising_the_nutritional_impact_of_fsl_interventions_0.pdf

- The Contribution of Forests to Sustainable Diets - http://www.fao.org/forestry/37132-051da8e87e54f379de4d7411aa3a3c32a.pdf

16. 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.

16.1. 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.

16.2. 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.

16.3. 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.

16.4. 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.