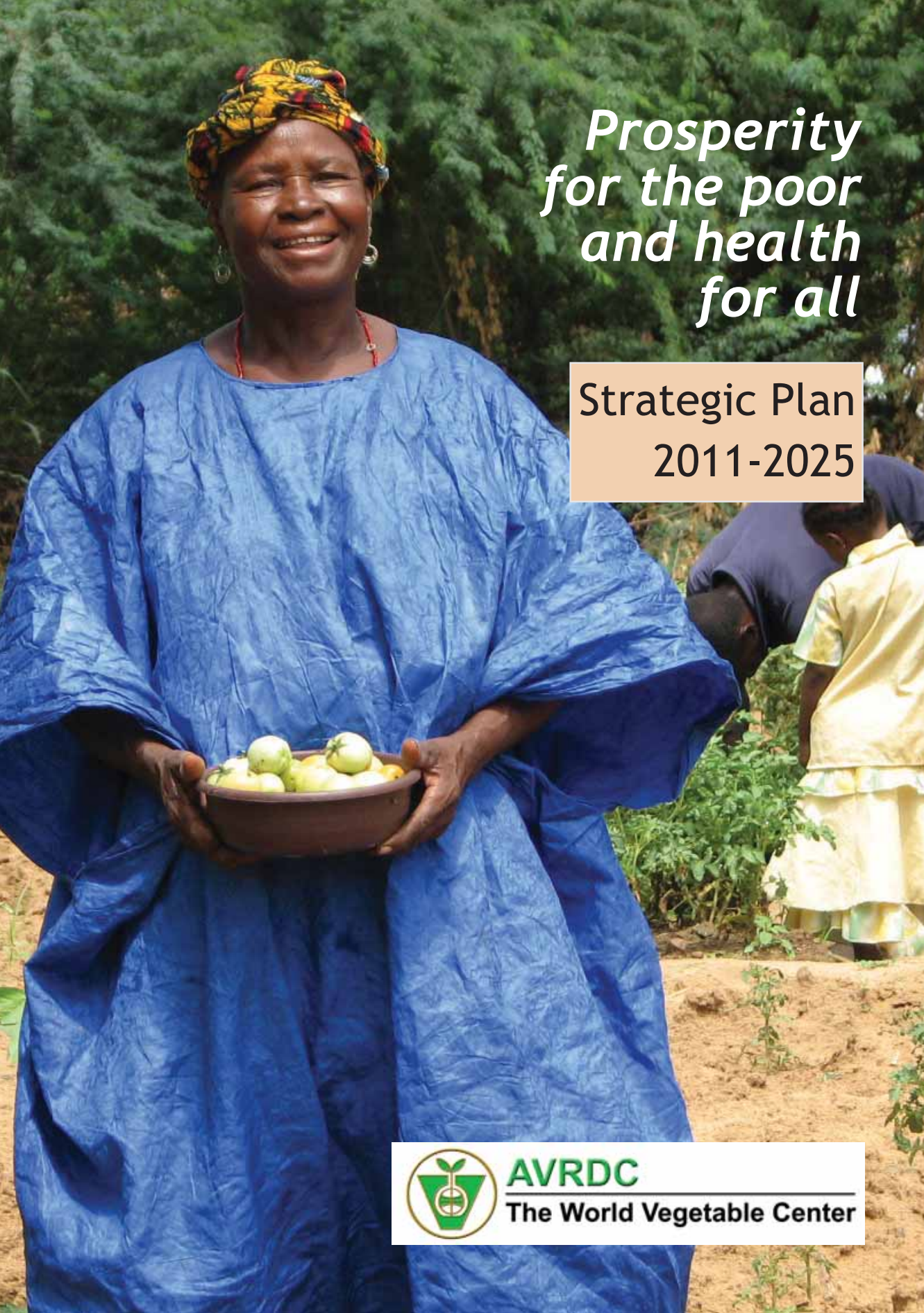

Prosperity for the poor and health for all

Strategic Plan 2011-2025

AVRDC
The World Vegetable Center

Prosperity for the poor and health for all

AVRDC - The World Vegetable Center

Strategic Plan 2011-2025

AVRDC – The World Vegetable Center is an international nonprofit research institute committed to alleviating poverty and malnutrition in the developing world through the increased production and consumption of nutritious and health-promoting vegetables.

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WHO *we are*

AVRDC - The World Vegetable Center is the only nonprofit international agricultural research center with a worldwide and exclusive mandate for vegetable research and development.

Founded in 1971 as the Asian Vegetable Research and Development Center (AVRDC), the Center's work has expanded globally. Headquartered in Taiwan, the Center will have as of December 31, 2010 more than 50 international scientists and 290 national scientists and support staff. We have regional centers for Africa, East and Southeast Asia, South Asia, and West and Central Asia and North Africa with offices located in Tanzania, Thailand, India, Dubai UAE, and six other countries.

Why the world needs a world vegetable center

While the world is making some progress on poverty reduction, it is having less impact on the growing scourge of malnutrition due to imbalanced diets. More than a billion people suffer from chronic malnutrition and hunger. For the first time in history, a third of the world's population is malnourished through imbalanced and excess consumption resulting in obesity, reduced life expectancy and increased incidence of diseases such as Type II diabetes. There are, therefore, two contrasting but synergistic drivers for research and development to improve nutrition.

Vegetables are the vital missing ingredient

Vegetables are our most important source of the micronutrients, fiber, vitamins and minerals essential for a balanced and healthy diet. They are also a major source of cash income for smallholder farmers. But in most countries of the world, production is too low to provide their populations with even the minimum intake required for good health. Diets in many developing countries can commonly be overloaded with more accessible carbohydrates and fats resulting in increasing global rates of obesity. Contamination from microbial sources and pesticides also reduces the safety of many vegetables in developing countries and high postharvest losses further reduce the availability of the relatively little that is grown.

For almost 40 years AVRDC – The World Vegetable Center has been the world's leading international center focused on vegetable research and development. We maintain the world's largest public sector vegetable genebank, with a focus on hardy indigenous vegetables important as food for the poor as well as wild relatives of common vegetables. Our improved varieties are planted on millions of hectares around the world and our production and postharvest technologies have made major improvements in smallholder incomes.

We seek to look forward at least 15 years in this plan, as this period would encapsulate the likely minimum time required between initial trait identificaton and broad-scale development impact of an improved variety.

Why we need the world to help the Center

We need the world to take better cognizance of the last 40 years of substantial achievement by the Center and to grant it the credibility, visibility, and funding it requires to fulfill the serious international role with which it has been mandated. This strategy is designed to bring about a change in visibility and credibility for us to obtain the tools needed to make our substantive contribution toward the attainment of the Millennium Development Goals.

The mission we seek to achieve

We seek to overcome malnutrition and poverty and facilitate good health for both the rural and urban poor by increasing the production, quality, consumption and profitability of nutritious and health-promoting vegetables. This will be achieved by promoting crop diversity and better balanced diets to help to reduce obesity and associated health problems. We promote good agricultural practices, opportunities for greater employment, and effective postharvest value-addition and marketing mechanisms.

This challenging mission requires the Center to integrate production with consumption and nutrition within a complex research structure.

A center of excellence in research and development on vegetables

We envisage AVRDC as continuing to be **the** international center of vegetable research and development excellence. We will be a creator of high quality research outputs, a source of experienced development partnerships, an access point for practical information, and the key node in global vegetable research and development networks.

The Center must be a credible partner through which donors and collaborators can readily see enhancement of the impact of their contributions toward achieving the Millennium Development Goals and beyond. We also envisage that the Center will be a bridging partner through which many private sector companies and foundations can make specific contributions to alleviating poverty and malnutrition in a targeted, attributable manner.

WHY
the Center will do what is proposed in our Strategic Plan

Endemic malnutrition, hunger, obesity, ill-health and poverty characterize the world in 2010. More than one billion people throughout the world are suffering from chronic malnutrition and hunger; the large majority of these households also remain in poverty.

Goals unmet

The Millennium Development Goals will not be achieved by 2015. Greater commitment to agricultural research and development could have made a very substantial difference to achieving the goals, particularly Numbers 1 (Eradicate extreme poverty and hunger), 4 (Reduce child mortality), 5 (Improve maternal health) 6 (Combat HIV/AIDS, malaria and other diseases) and thus 3 (Promote gender equality and empower women). Many of those who are not overtly hungry still suffer from the "hidden hunger" of chronic micronutrient malnutrition.

For the first time in human history a larger proportion of the world's population suffer from obesity than hunger. Several billion people—a third of the world's population—are malnourished through imbalanced and over-sufficient calorie intake resulting in obesity, reduced life expectancy and vulnerability to diseases such as Type II diabetes, metabolic syndrome and some forms of cancer. Moreover, obesity seriously contributes to reduced human mobility through skeletal overload, causing severe back, hip, knee, and ankle pain, lowering energy and stamina, and substantially reducing human labor productivity and the quality of life of people of all ages. This is a rapidly growing problem that predominantly affects the poor and is a growing concern in developing countries.

Balanced human nutrition, providing sufficient energy and an appropriate amount of protein, fat, fiber, vitamins and micronutrients contributes to meeting the Millenium Development Goals and would directly eliminate malnutrition. Vegetables are our most important source of the necessary vitamins and micronutrients required for a balanced diet. Moreover, they also provide taste and diversity in the diet which encourages good eating habits. Vegetables are thus a vital component in strategies to ensure human food and nutritional security.

Getting malnutrition and health-promoting food production onto the global development agenda

The World Development Report 2008 clearly shows malnutrition is an issue that has fallen to a level of priority that is much too low. It states that malnutrition is often invisible, with poor community awareness of its threat to health and well-being. Governments have failed to recognize the pivotal role that malnutrition has on economic performance and that there are multi-organizational stakeholders in different aspects of nutrition. As a consequence, nutrition falls between the cracks of government priorities and departments (nutrition responsibilities are the partial responsibility of many, but the main responsibility of none). Such attention to malnourishment also needs to include attention to the practices that contribute to unsafe vegetable production such as the chronic misuse of pesticides (exposure to pesticides as well as product adulterants), use of grey water in production and in vegetable processing (giving high levels of human pathogen contamination) and ineffective and unhygienic storage that may encourage mycotoxin and bacterial contamination as well as reducing the amount of edible product after storage.

WHAT
we will do

Our program focus: The tactical elements of our improved strategy are outlined in the following section but the detailed activities which these tactics engender are presented in the annual updates of our three-year rolling Medium-Term Plan.

Our target crops will be nutritious exotic and indigenous vegetables

We will continue to emphasize our work on crops that have good nutritional and/or market value including both exotic (tomato, pepper, onion and eggplant) and indigenous vegetable species (nightshade, slippery cabbage, ivy gourd). Likewise, we will continue to encourage much broader vegetable cropping diversity, both to reduce risk and to help contribute to a healthy and well-balanced diet. We will also continue our work on those crops that have greater nutrient density (ie. more vitamins, protein, minerals and antioxidants per unit of weight or volume consumed) and known, but underexploited, health benefits. Such crops will include species that are high in vitamin A precursors, minerals and antioxidants (amaranth, moringa, pumpkin), have high protein content (mungbean and vegetable soybean) or have prophylactic health care qualities for diabetics (bitter gourd). The outcome will be that seed of such valuable species will be available to all, and that our breeders will have the opportunity to make targeted selections for improved production and nutritional value.

Our most important asset will be our genebank and its precious resources

We will conserve, expand, and exploit germplasm, and share information from our genebank, the world's largest public sector collection of vegetable genetic resources. It contains approximately 57,000 accessions (particularly mungbean, soybean and solanaceous species) representing 8% of the total CGIAR (Consultative Group for International Agricultural Research) SINGER (Systemwide Information Network for Genetic Resources) global database. This genebank and its valuable germplasm material will be maintained in perpetuity for the benefit of current and future generations of humanity. We will continue to collect, categorize, share in the public domain and use new genetic material as fully as possible. We will increase our efforts on molecular characterization of existing and new entries to the collection and ensure

that this information is easily accessible. The Center also hopes to expand its collection of indigenous vegetables, which are a key feature of the genebank's unique species-rich character. The genebank maintains more than 400 species overall. Preservation of vegetable biodiversity will fulfill our responsibilities to the global plant breeding community and to the generations ahead to help meet future challenges.

Our parental material will be valuable for biotic and abiotic stress management

We will therefore continue to improve and place parental material with new, desirable traits in the public domain. We will particularly focus on globally important vegetables suited to hot/wet and hot/dry tropical environments such as tomato, pepper, eggplant, okra, and onion. We will work as a team with our colleagues in the private sector, the CGIAR and other international centers and the advanced research institutions in upstream trait discovery for resistance to pests and pathogens. Presently, material is available with resistance to anthracnose, late blight and *Tomato yellow leaf curl virus* (TYLCV) and we hope in the future to offer material with resistance to tospoviruses. We will work with all our partners as well as regional and national organizations for practical implementation of the outputs needed to combat the constant and deadly metamorphoses of these severe horticultural pests and diseases afflicting poor and rich farmers alike. Broad use and dissemination of such genetic resources will be vital factors in ensuring success in the continuing struggle against constantly changing plant growth stresses.

Our research and development partnerships are valuable operational mechanisms

Our scientists will work with a spectrum of partners from both the public and private sectors and at all points along the vegetable value chain. The mix of different partners will be location-specific and will depend on our capacity in the region and the capacity of our local partners.

Potential partners could include any or all of the following:

- The national agricultural research and extension systems (NARES), including universities and their equivalents in the health sector
- Regional and subregional research organizations and networks
- International and local nongovernmental organizations (NGOs)
- Private sector partners (including the full range of private sector partners from small-scale local entrepreneurs to multinationals)
- International agricultural research centers (IARCs)
- Advanced research institutions
- Farmers' and women's groups
- Civil society, community based organizations, and other social organizations

We will work with partners of all sizes in a research and capacity building program that will favor the public sector and small-scale private sector companies who lack, or have inadequate, breeding programs and are unable to multiply seed effectively and efficiently. For example, many of the island nations in Oceania lack such capacity and are currently dependent on imported hybrid material that may not be well-adapted to their specific environmental conditions. Nevertheless, the larger companies and countries with well-established vegetable breeding and seed multiplication programs will also be able to benefit from AVRDC's research output. This will include our partners in the Asia & Pacific Seed Association such as Clover Seed Co. Ltd. and East-West Seed Co. Inc., and from the African Seed Trade Association such as East African Seed Co. Ltd., Rijk Zwaan Afrisem and many others.

To undertake these changes in the Center's research and development emphasis, we will seek, in addition to our key allies in the agricultural sector, to link much more closely with public and private sector institutions in health, education, and water management. Such a broad scale of partners will be needed along with our current research and development

linkages to address the chronic issue of malnutrition and long-term issues of climate change and uncertainty.

The result of these actions will be enhanced likelihood of success in meeting development challenges that are frequently highly complex and usually beyond the range of single disciplines and single institutions to address effectively.

With climate change becoming a major challenge and threat to productivity gains

We are planning to expand our research and development portfolio to further address these potential challenges. Response to climatic events, such as short-term flooding, is an area in which we can immediately contribute to the global fight to ameliorate the effects of unpredictable environmental forces.

The Center will develop programs to manage the likely increases in biotic stresses due to climate change: Pests and pathogens have been a continually changing challenge and threat to the crops and livelihoods of poor farmers. We expect ongoing climate change forces to result in more stressed crops that are vulnerable to pest and disease attack. Climatic changes may also drive the selection pressure for more virulent fungi, bacteria and viruses and our breeding programs will seek to monitor such trends and incorporate resistance traits where possible. Techniques as well as resistance breeding, such as exotic grafting, integrated pest management (IPM) and better protective measures, will be further exploited to reduce farmer exposure to crop losses from such factors. This will

result in farmers being better prepared to handle future climatically-induced production uncertainties.

Better parental material in response to abiotic stress and related climate change challenges: The Center will strive to develop stress-tolerant lines that at least match the yield of conventional varieties under non-stress conditions, to meet the needs of a changing climate. We will seek to improve the heat and drought tolerance traits of our parental germplasm of sensitive but economically critical species, such as tomato and pepper. This work will assist their adaptation to a wide range of geographic environments by exploiting genes found in wild solanaceous germplasm that often are native to hot desert environments. The Center is arming itself to deal with demands for varieties suitable for drier and hotter environments as such environmental changes are expected to occur in many developing countries.

Efficient, water- and nutrient-conserving crop management techniques will be a central agronomic tool to address climate challenges: The Center will design improved agronomic practices that conserve water, including microirrigation, and bolster vegetable crop production against suboptimal environmental conditions. Protected cultivation measures will be enhanced and made easily accessible to farmers in the developing world. Such

measures will include greater use of plastics and other mulching material to better control weeds and provide temporary shelter against hostile environmental factors. Effective rhizosphere-soil management practices will be developed through reduced cultivation techniques, improved fertilizer placement and better use of composts to assist in improved water and nutrient use efficiency and retention in the soil root zone, and to promote growth of beneficial microbes. These measures are complimentary to plant breeding efforts for stressed environments, which are expected to become increasingly common in future years.

Focus on nutritious indigenous vegetables that can be robust producers in the face of climatic uncertainty: We will also increase our attention on nutrient-dense, indigenous vegetables that are naturally often more nutritious and can grow effectively in relatively harsh environmental conditions. We will ensure that the selections we make for better nutrient-density and production characteristics retain their environmental tolerance and thus reduce the production risks experienced by poor farmers. Vegetable germplasm with tolerance to environmental stresses and the ability to yield well in marginal soils will be identified to serve as sources for public and private vegetable breeding programs. Presently, such species being examined include amaranths, cucurbits, and indigenous species related to okra. Availability of seed of such species will play a major role in the future to help ensure nutritional security and well-balanced diets for poor small-holders and urban growers for whom access to cost of production inputs may be inhibiting.

Simple, low-cost but effective postharvest technologies will be emphasized for increasing profitability and maintaining nutritional quality: The Center will seek to expand its present expertise in human nutrition and in postharvest quality maintenance. Vegetables, in particular green leafy products, deteriorate rapidly between harvest and consumption. Loss of quality affects their profitability for traders and nutritional value for consumers. This occurs throughout the world. But

the problem is particularly severe in the developing world where a large proportion of produce is often lost, even in societies with good wet market structures such as in the Mekong region of Southeast Asia. We will seek to breed crops with higher nutrient density and longer shelf-life to ensure the greater bioavailability of the proteins, vitamins, minerals, and antioxidant chemicals present in the vegetables when consumed. AVRDC-bred golden tomatoes and long shelf-life broccoli are both good, current examples of these types of product.

The research will concentrate on simple, intermediary technologies to facilitate quality maintenance of vegetables in storage, transport to market, and increased shelf-life that can be introduced quickly in developing countries as an alternative to the large capital investment in equipment required to duplicate the centralized postharvest handling systems typical of many developed countries. Small-scale drying and chilling processes in Vietnam have been shown to allow substantial added value to vegetable products and help in additional job creation all down the marketing chain. Over the last decade the predominant research efforts in vegetables have been to improve productivity. Yet in the face of endemic postharvest losses throughout the developing world, it seems that this area of research must be expanded to redress such problems. Thus, this area will become one of the Center's research priorities.

Vegetable seed kits for improved nutrition, will be useful instruments for income generation and disaster relief: The Center will continue to expand its present emphasis on regionally-adapted vegetable seed kits comprising seeds of a range of adapted, nutritious vegetables appropriate for households, schools, prisons, and hospital gardens and which specifically benefit women, children, the elderly and other vulnerable groups. We believe that such kits also could be a way to kick-start small-scale entrepreneurship and can be the first step for families to grow themselves out of poverty. These kits have proven to be effective in bolstering vegetable

consumption and income generation in poor areas of South Asia such as Jharkand State in India, in Southeast Asia in the Philippines, and in several regions in East Africa. Seed kits for improved family nutrition also will be expanded into a program of pre-positioned, regionally-appropriate, fast-growing, nutritious vegetable seed kits for disaster response. Within six months of the first creation of such a reserve in 2009, victims of typhoon Morakot in Taiwan and the January 2010 earthquake in Haiti have received the benefit of our seed kits. The outcome must be beneficial to people affected by natural disasters but in addition should significantly raise the profile of the Center and would be an effective entry point to donors for additional new funding.

HOW

we will cost and pay for our new strategic research and development thrusts

Financial projections and management: The details of the tactical deployment of this strategy will be provided as a component of the Center's rolling three-year Medium-Term Plan, which is supported by an annual budget and plan of work.

Financial resources

In order for the Center to implement its proposed research and development plans effectively to the satisfaction of its partners and stakeholders, it will require expanded financial resources and personnel. Major efforts will therefore be made to not only expand the budget significantly beyond the current ~US $18 million per year but also to diversify considerably the core funding base which historically has been too narrow and dependent on a very few loyal and committed donors. We also will reinvigorate founder member country involvement and find new partner countries and organizations.

Budget growth and diversification

This substantial budget growth and diversification has been sought—but not achieved —by the Center almost from its inception. Centers that were established around the same time with the help of the Rockefeller Foundation now have annual budgets exceeding $50 million. Although budget comparability with such institutions is a difficult target, it is nonetheless the correct goal. The Center must therefore continue to seek vigorously for additional funding from diverse sources and must be successful in this endeavor over the next decade. This additional funding should allow the maintenance of a suitable balance of core and special project funding that can allow the Center to be managed effectively.

We will also focus our research and development activities in specific geographic and thematic areas to maintain a critical mass of resources. We will be mindful to avoid excessive decentralization to allow our personnel resources to be deployed effectively. Funding requests will therefore be focused on those geographical and thematic areas that meet the needs of our priority partners and stakeholders and for which specific donors have particular interests. Suitable advocacy with donors will also be needed to focus their thinking appropriately on the central role of vegetables to provide solutions for malnutrition and improved incomes for the rural and urban poor.

Of special concern has been the long-term lack of funding for postharvest research. The Center will make a specific effort to ensure that funding for improved human nutrition and postharvest research are more evenly balanced in the future with efforts on production and profitability throughout the market chain in order to redress prior historical under-investment.

We will operate on a full-cost recovery basis so that we achieve the highest impact with current resources and have a clear understanding of what needs to be done next when more funding comes on stream.

Improving efficiency: Budgetary adjustments to bring about change

To remain flexible to make immediate changes, the Center also must be willing to reduce its current emphasis in certain areas. These areas remain deserving but have been selected for reduction because other institutions, such as the large private seed companies or producers in Asia, have achieved predominant capability such that our own activities appear to be inadequately justified by good outcomes and impact.

We propose therefore to a) minimize our research efforts on cabbage, cauliflower, garlic and shallots and b) fully ensure all training is carried out on a full-cost recovery basis. Training activities will be undertaken case by case, and only where impact can be seen to be beneficial to the center's credibility while minimizing the additional time commitment of the Center's staff. Examples such as higher degree placements with their activities based on the Center's priority research areas would fulfill the appropriate criteria.

Refocusing of research areas

We will reduce our commitment to crop management research at our headquarters in Taiwan and reassign staff where possible as such research now seems to be better handled by local partners. To improve research efficiency further, we will combine our mycology, bacteriology, virology, and entomology groups at headquarters into a single crop protection entity. In addition, some breeding efforts appear

to be geographically misplaced such as onion breeding in Taiwan (seed production difficulties) and mungbean in Thailand (South Asia being the principal target area). These will now be transferred to Mali and India respectively. Curcubit breeding also will be transferred from Taiwan to Thailand in order to help obtain multiple crop generations per year and to better manage plant disease pressure and disease screening issues.

Concentration of our research and development efforts to improve effectiveness and our attractiveness to donors

We will work principally in tropical/subtropical rural and peri-urban poor farming environments. We will target not only those nations with large concentrations of poor households in South Asia and sub-Saharan Africa, but also support research and development activities on behalf of people living in small countries with limited research capacity, disaster-prone areas or in post-conflict nations.

In these cases, research infrastructural capacity of both the public and private sectors is inadequate to meet their domestic vegetable seed requirements, to facilitate safe agricultural production practices, and to meet dietary diversity needs.

We recognize that enhanced visibility due to active participation in disaster relief will be beneficial to our credibility with donor agencies but also recognize that it will be a much harder task to convert one-off support into longer term funding. We will seek to meet this challenge head-on.

In addition to sub-Saharan Africa and South Asia, and some activities in Central and West Asia and North Africa, the remainder of AVRDC's work will be in the Asia-Pacific region: East and Southeast Asia, and in Oceania the sovereign states in Melanesia, Micronesia, and Polynesia. This focus also reflects the priorities of the principal financial supporters of AVRDC: the Republic of China, the other founding Asian nations, the United Kingdom, the Federal Republic of Germany, the

United States of America, the Australian Center for International Agricultural Research (ACIAR), the Asian Development Bank (ADB) and the Asia & Pacific Seed Association (APSA).

Our next target for further geographical expansion later in our planning horizon remains Central America, but this option will only be considered as and when the Center's current budget has been increased by at least one third (essentially by an extra US$5-10 million per annum) and with money earmarked specifically for research and development activities in this region.

OUR TARGETS

On whom do we expect our research and development outcomes to take effect

At a generic, global level: We will play our role wholeheartedly in bringing about a world in which malnutrition is eradicated and vulnerable groups such as expectant mothers, children, the elderly and the sick have well-balanced diets with better access to a diverse range of vitamin and mineral-rich fruit and vegetables amounting to at least 400 g/person/day. Our new research and development thrusts are designed specifically to help reach this target and associated Millennium Development Goals.

Advocacy and education

We will seek to be a clear beacon of advocacy to overcome the prevailing lack of comprehension of dietary requirements and their health implications among populations in both developing and developed countries. This will ensure better understanding of the rationale for, and the means to attain, a balanced, healthy diet. We will speak out vigorously for better nutrition for all malnourished people.

Availability and affordability

In addition to the need for education, there is a requirement for greater vegetable availability and affordability to different segments of the population. Such vegetables must be of good quality, where possible nutrient dense, and also safe to consume without contaminants such as pesticide residues and pathogen loads. We expect our breeding programs, improved crop management techniques, and promulgation of good agricultural practices to have a substantive impact in our target areas and for our partners to help such outcomes to reach large numbers of farmers, marketers, and consumers at a regional and global level.

Supply chains and income generation

We will assist more small-scale farmers and their potential market chain partners to adopt horticulture as a more secure means to grow themselves out of poverty, given the generally higher profitability and shorter investment period of vegetable production compared to that of cereals and starchy staples. Higher labor demand in vegetable production will also offer greater employment opportunities for poverty alleviation to the landless. The generation of higher incomes and creation of abundant labor opportunities along the vegetable value chain will generally benefit and empower women, as globally women have historically predominated postharvest handling and marketing.

Disaster responses

We will ensure that our pre-positioned disaster relief seed kits will find an effective and beneficial niche in the mitigation of natural and man-made disasters that impact the poor globally. This will be an important new factor in raising donor awareness of the Center's activities and for our better brand recognition at a global level among the NGOs and communities receiving our assistance.

At regional levels:

Sub-Saharan Africa

AVRDC – The World Vegetable Center's work will make a substantive and measurable contribution to reduce malnutrition in sub-Saharan Africa through breeding programs for both exotic and indigenous vegetables, improved seed systems, and crop diversity promulgation programs with additional special mentoring of small-scale public-private sector partnerships to support the goals of the Center. We expect micronutrient-rich lines, such as amaranth, African eggplant or β-carotene-rich yellow tomatoes to be developed as varieties and distributed by the private sector throughout sub-Saharan Africa in same manner in which our tomato varieties 'Tanya' and 'Tengeru 97' now dominate their respective markets in Tanzania and are expected to soon spread through Eastern and southern Africa. In this effort we will complement the efforts of our major regional partner ICRISAT (International Crops Research Institute for the Semi-arid Tropics) that specializes in locally-adapted protein-rich legume crops such as pigeonpea and groundnut and staple cereals (sorghum and millet). This partnership also extends to reinforce our efforts in improving nutrition and profitability in South Asia. We will also closely involve our other IARC partners in Africa: IITA (International Institute of Tropical Agriculture), ICRAF (World Agroforestry Center), WARDA (African Rice Center) and *icipe* (African Insect Science for Food and Health).

South Asia

In South Asian countries we will focus on vegetable seed kits to be the standard initial seed source for smallholder home gardens and institutional vegetable gardens for schools

and hospitals. These kits are specifically selected to be appropriate for farming and social systems in the region. Their use will improve the nutritional and food security of the poorest and smallest landholders and should permit them to be self-sufficient in vegetables throughout the year. With appropriate food preparation methods, which will also be part of the Center's information dissemination activities, the nutritional status of families and communities will be improved. This general improvement in health will have an impact on immune systems and will help overcome some of the most deleterious consequences of diseases such as malaria and HIV/AIDS and reduce stunting, the impairment of learning ability, and night blindness in children. This also applies in other regions of the world, especially sub-Saharan Africa.

Southeast Asia

In Southeast Asian countries we will support small and medium-scale private sector companies and work closely with the national agricultural research and extension systems to develop improved, trait-specific parental material so that new lines with improved pest and disease resistance can be made available in the market. We will also work closely with urban and peri-urban vegetable producers in the Greater Mekong area to improve productivity, reduce postharvest losses, and increase income generation and profitability. This will continue our emphasis on ensuring safe vegetable production in which reduced pesticide contamination, safer use of grey water, improved storage technologies and better postharvest management and transportation will result in more nutritious and more profitable vegetable products.

CWANA (Central and West Asia and North Africa)

In Central and West Asia and North Africa, we will dovetail our strategy with that of our current major partner ICARDA (International Center for Agricultural Research in the Dry Areas) and thus give greater emphasis than previously to issues associated with protected agriculture (net and plastic house agriculture), extended seasons of production, and greater water

use efficiency. The Center will also maintain its activities in Central Asia and the Caucasus, focusing on improved vegetable lines and crop management methods, and seed production. Lack of crop diversity remains an important constraint to productivity and profitability and new crop introductions and alternative rotational options will be given greater emphasis. Participatory variety trials will be continued as a means of increasing exposure of the national agricultural research and extension systems to new lines and varieties and extending the availability of the new material.

Oceania

For the island nations of Oceania, the Center will diversify their vegetable production opportunities and limit their current dependence on the imported hybrid seed market. Viable local seed and seedling enterprises will be encouraged and indigenous germplasm such as *Abelmoschus* spp. (slippery cabbage) will be preserved and utilized. The use of home gardens and locally grown products will be important parts of advocacy for better

household nutrition in association with key regional partners such as the Island Food Community of Pohnpei. This NGO has had substantive influence on behalf of improved nutrition regionally but to date has concentrated on starchy staples and bananas rather than vegetables. We will contribute to existing ongoing long-term educational and dietary diversity campaigns against malnutrition and specifically to combat obesity and the onset of Type II diabetes and metabolic syndrome, such as is found in the Marshall Islands.

The impacts we expect to achieve as a center of vegetable research excellence

Improving the levels of molecular characterization of our germplasm collection will make trait selection more feasible. Molecular information will drive the development of more markers for accelerating breeding. We will take further steps to ensure that information relevant to the further exploitation of these genetic resources is fully transparent and more easily available to all.

The Center will become the global focus of breeding improvement for currently neglected indigenous vegetables that are either nutrient-dense or known to contain health-benefitting properties. This will begin with work on African eggplant, amaranth, nightshade, bitter gourd, African okra, and slippery cabbage.

By exploiting the wild and cultivated genepool of the solanaceous species, our breeders will get ahead of the environmental vagaries associated with climate change. The potential of grafting using novel combinations among these species will be used for new technologies to tolerate flooding, soil-borne diseases and other abiotic stresses.

Over the next 10-15 years we will tackle the problem of tospoviruses head-on and will become world leaders in the identification, recognition of the agents of transmission, and provision of the means to provide resistance to these newly emerging global threats.

New techniques for improved crop management will be

introduced at levels that are suitable for wide-scale adoption by poor farmers and we will continue to advocate and promulgate Good Agricultural Practices (GAP) such as integrated pest management measures to ensure the safety and nutritive quality of vegetable products both pre- and postharvest.

We will maximize at regional level the efficiency of all elements of the market chain and devise chain models that provide a fair deal for smallholder farmers and marketers and make vegetables sufficiently affordable to the urban poor to help overcome the threat of malnutrition through adoption of better balanced diets.

High quality capacity building in all areas associated with the work of AVRDC - The World Vegetable Center will be delivered. The future sustainability of the Center's efforts at all levels, from local to international, will be maintained.

We will ally ourselves closely with the health and nutrition sectors to ensure that our efforts to overcome malnutrition through crop diversity are in harmony with our partner's efforts in work involving the fortification and biofortification of diets.

Helping women achieve greater equity

Growing vegetables provides greater opportunities for women than work on farms producing predominantly starchy staples or cash crops. AVRDC will capitalize on these opportunities, which include hiring additional labor on, as well as off, the farm. Women have a significant role in value-addition after harvest, and their participation in vegetable value chains not only has implications for income but also for their, and their children's, nutritional status. Employment opportunities for women in the operations after harvest can be significant, thus empowering women not only within the households, but at the community level and at higher levels thereafter. The Center will monitor and make more strategic effort in furthering equitable gender relations throughout its research and development activities. We will work to ensure that equity is promoted rather than hampered by our technologies and processes.

The Center's geographical locations are where women often require support to empower themselves in vegetable production and vegetable market chains.

Our expected impact on capacity building

Historically, AVRDC has trained several thousand NARES, NGOs and private sector staff and farmers. We expect to continue such activities at a comparable scale and thus a substantial number of agricultural and horticultural scientists (higher degree students and on-the-job training), nutritionists, water specialists, and development practitioners will receive specialist training during the next 15 years. This will strengthen the public and private sector capacity for plant breeding and seed production in a range of countries in sub-Saharan Africa, Central and West Asia, Oceania, and elsewhere. The technologies developed by the Center, and the training and capacity-building, will contribute to improving production capacity, mitigating the problems generated by climatic uncertainty and reducing risk, enhancing the role of women, reducing postharvest losses, and contributing to increased health and nutrition. Such information and technologies will be promulgated in the public domain.

Achieving a balance in research and development activities: Our unique mandate

The Center will continue to find the appropriate balance between research and development. One of the many advantages to working along the continuum is that the end-users' needs and requirements are easily made known to those doing the research, and thus are incorporated at the beginning of the research process at the Center. Multidisciplinary teams will ensure that all aspects of a constraint are understood and all the potential opportunities are assessed. AVRDC has flexible and innovative teams of scientists performing leading research and able to adapt local innovations from one part of the world to others. The Center will build on its current Global Technology Dissemination activities. These will be strengthened and used as the conduit to deliver

technologies, thus leaving the more upstream scientists relatively free to pursue targeted research and to ensure the Center has the best technical capacity to deliver the technologies properly so that they create sustainable impact.

The Center's role in research and development will be better appreciated globally through our outreach and communications strategy

While AVRDC – The World Vegetable Center's research

and development outputs must be good enough to speak for themselves among our stakeholders, the Center will also work towards increasing the scope and appreciation of its work globally through increased publicity and advocacy. The Board of Directors also will increase their efforts in working with the management in effective advocacy.

We will contribute to international conferences and related events as the premier public international horticultural research institute and we will seek to guide the policies of countries where malnutrition and lack of dietary diversity remains a constraint to human health. Through face-to-face communications the Center will seek to inform donors on opportunities to alleviate poverty and malnutrition with high value, nutritious vegetables. The Center will speak out to the people and policy makers of developed and developing countries on the likely economic and health burdens arising from a significant proportion of the population being obese and prone to non-communicable diseases such as Type II diabetes, and the chronic physical consequences resulting from unbalanced diets.

Through our publications we will provide targeted, readily available and accessible information that is useful for researchers, development workers, farmers and policy makers. The Center's scientists will increasingly publish in academic journals of good standing and further produce effective extension materials. Staff will be trained to effectively use communication media and to publish for different audiences and purposes in our different publication series. Electronic distribution will be the main form of dissemination for all but a few extension publications. There will be increasing use of Open Access journals where appropriate, and compliance with international standards for document indexing and metatagging to ensure that our publications are freely accessible via major global search engines and document repositories.

Electronic media will be a major focus of our communication activities. We will maintain a current and informative English language website with most sections also available in French and Chinese. The Center's website will play an increasing role as a portal to promote the breadth of our work, access our publications, order germplasm, interact with Center staff and build connections to leading global vegetable research and development partners.

Through short production cycle, adapted and easy-to-grow vegetables, the Center will become involved to a much greater extent in disaster mitigation and post-conflict support by preparing and storing large numbers of home garden seed kits (which will also include production and consumption information prepared in local languages), pre-positioned with those who are at the forefront of disaster relief activities to disseminate the seed packs on the Center's behalf in the most appropriate and effective manner. This will also allow us to respond quickly to the requests of important donors such as the United States of America (USAID) and the United Kingdom (DFID) who have contacted the Center in the past to assist in disaster mitigation.

Conclusion

In the years ahead, AVRDC – The World Vegetable Center must certainly live up to its name and become the premier international public-domain center of excellence for research and development on vegetables working on behalf of the developing world. We will make major positive contributions to the alleviation of poverty, to the eradication of malnutrition and food and health insecurity, and to the promotion of the good use of germplasm and environmental resources employed by all vegetable growers, both large- and small-scale.

We expect to have substantive outcomes and impact at a global level and thus will justify the confidence our investors placed in us historically. Our research and development outputs in the future will further demonstrate our commitment.

We will thus continue to proudly claim that we can help bring "Prosperity for the poor and health for all."

AVRDC
The World Vegetable Center