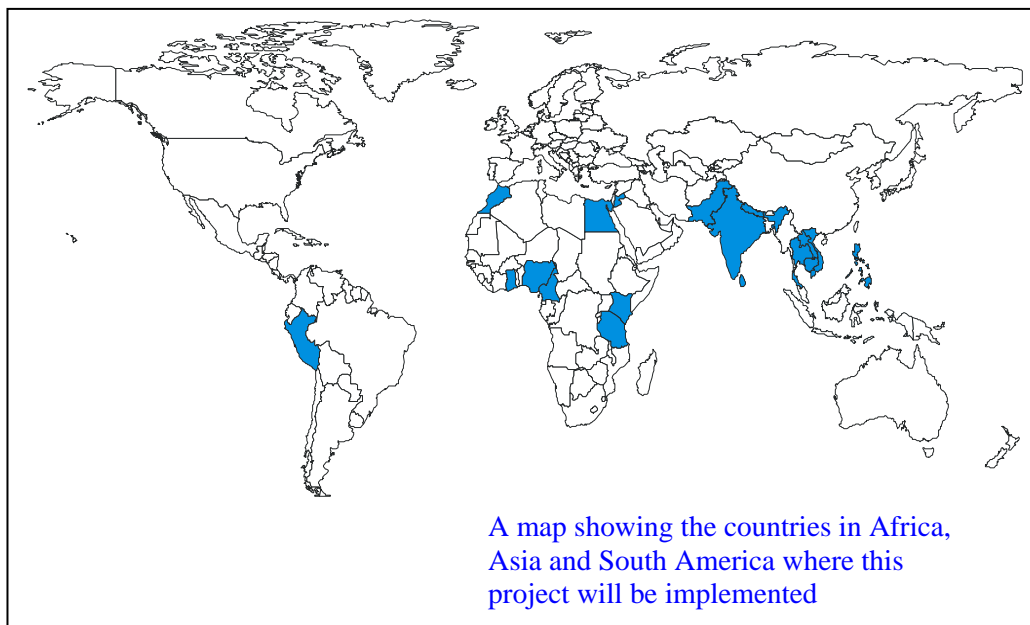


BETTER LIVES FROM HEALTHY SOILS: INTEGRATED PEST MANAGEMENT IN SOILS OF YEAR ROUND VEGETABLE PRODUCTION SYSTEMS IN THE TROPICS AND SUB-TROPICS



IARC PARTNERS

AVRDC - Asian Vegetables Research and Development Center

CIP - International Potato Center

IITA - International Institute for Tropical Agriculture

CABI - Center for Agriculture and Biosciences International

WARDA - West Africa Rice Development Association

COORDINATING CENTER:

AVRDC - Asian Vegetables Research and Development Center

Systemwide Program on Integrated Pest Management (SP-IPM)

A CGIAR global effort to improve livelihood of poor farmers by reducing crop losses and producing more food in a sustainable way

INTRODUCTION

It is estimated that by 2025 as many as 5.3 billion (2/3 of the world's projected population) will be living in urban areas. The development of production systems to meet the needs for perishable fresh vegetables in this burgeoning urban population poses major challenges for agricultural research. Intensive vegetable production systems including the peri-urban or so-called 'green belt' zones surrounding major population centers and other concentrated high production areas are the main sources of perishable vegetables for urban dwellers; the stability and environmental friendliness of these systems need to be improved if they are to continue to function sustainably. Soil-borne pests are limiting factors for vegetable production in intensive production systems in the tropics and sub-tropics. This is due in part to climatic conditions that permit year-round cropping and the limited availability of land in peri-urban and other intensive cropping systems that disallows the practice of long term rotations.

SOIL HEALTH AND PLANT HEALTH

There is a strong relationship between soil fertility and plant health, in the sense of plants ability to resist pests' attack. Poor land management and declining soil fertility often result in a negative feedback cycle characterized in part by an increase in soil-borne pests. Since plant health is intimately linked to soil health, managing the soil in ways that conserve and enhance the soil biota can improve crop yields and quality. A diverse soil community will not only help reduce losses due to soil-borne pests, but also speed up decomposition of organic matter and toxic compounds, and improve nutrient cycling and soil structure.

HIDDEN ENEMIES

A number of pests often attack vegetables from below the soil surface. The following are the major pests, which attack the year round vegetable production system in the tropics and sub-tropics:

Bacterial wilt
Fungal wilts

Root knot nematodes
White grubs



Bacterial wilt of tomato caused by *Bacterium solanacearum* inside plastic



Fungal wilt of tomato caused by *Fusarium* sp. *lycopercisi*.



The above mentioned pests often cause serious losses. Bacterial wilt could cause complete crop loss. For these soil-borne pests no chemicals other than chemical fumigants are available for control. However, this is often not affordable by poor farmers and not a sustainable method.

AN URGENT NEED FOR SAFE VEGETABLE PRODUCTION

There is a global need today for safe systems for pest management. This sub-project will do just that, by offering sustainable solutions to improve soil health and consequently crop health. This is accomplished by focusing on biologically-based means of preventing and managing pests, such as host resistance, biological pest control using natural enemies and cultural practices.

LINKING SCIENCE TO PRACTICE

Through research activities, this sub-project will develop a better understanding of the soil ecosystem and identify tools that can improve its management. Some of these tools require specialized knowledge and equipment and can only be used by scientists. However, in order to link science to practice it is essential to also develop simple indicators of soil quality and health that can be used by farmers. The best way of achieving this is by the use of participatory research strategies using simple on-farm techniques. It is necessary to consider the current farmer's knowledge and resources to form a locally adapted and sustainable technology.

WHAT CAN BE ACCOMPLISHED

It is expected that the project will achieve the following objectives in a five years period:

- a. Establish an international network on soil biota, fertility and plant health.
- b. Characterize soil-based constraints for the cereal/legume production systems.
- c. Improve the understanding of the dynamics of crops, soil biota and soil fertility interactions.
- d. Identify and evaluate management components for soil-borne pests.

- e. Identify and validate integrated pest and soil fertility management practices.
- f. Enhance farmers' capacity in soil management through knowledge development and exchange.

A GLOBAL EFFORT

Achievements of this sub-project will be through scientists from five IARCs (AVRDC, CIP, CABI, IITA, and WARDA) and NARS institutions in West Africa (Nigeria, Cameroon, Ghana), Middle East and North Africa (Jordan, Egypt, Morocco), Southeast Asia (Vietnam, Cambodia, Laos, Thailand, Philippine, Sri Lanka), and Latin America (Peru) and four advanced institutions from Australia, France, and Spain. A holistic approach will be followed through a multidisciplinary team including entomologists, nematologists, pathologists, soil and weed scientists, agronomists, physiologists, extension workers and socio-economists.

ESTIMATED BUDGET

The estimated budget for the project for a five years period is 1.85 million US dollars, and will be implemented in two phases. The estimated cost for the first phase (2 years) is 0.64 million US dollars, and for the second phase (3 years) is 1.01 million US dollars.