

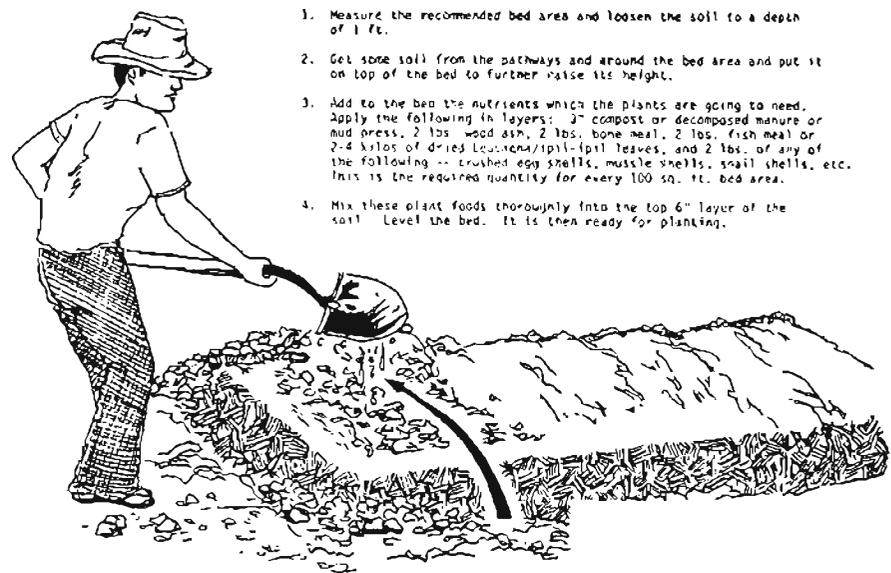
Bio-Intensive Gardening

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Alternatives to Conventional External-Input Based Gardening

The contribution of home-gardens or backyard gardens to household and thereby national food security has often gone unnoticed by policy makers and economists. Unfortunately, even international, multilateral and bilateral aid organizations, NGO's and governments have, at least in this past decade, tended to neglect this sector.

If one compares their level of funding support in the 1980's to that in the seventies, a low priority for gardens is evident. One reason may be the disillusion of these groups in the validity or relevance of home garden production in achieving household food security. Another reason might be the fact that the implementation of most garden efforts have not been sustained in the long run. A careful analysis of past efforts does indicate that the technology packages promoted tended to be based on the provision of seeds (usually western and commercial and often directly imported), chemical fertilizer and pesticides and even tools. The focus tended to be more on the material inputs than on the sharing of information or knowledge on gardening techniques. The success of such gardens, being linked to the infusion of external material inputs, therefore lasted only as long as the supply of these inputs was guaranteed. The suspension of funding inevitably led to the demise of the activity. It is within this context that an alternative strategy



1. Measure the recommended bed area and loosen the soil to a depth of 1 ft.
2. Get some soil from the pathways and around the bed area and put it on top of the bed to further raise its height.
3. Add to the bed the nutrients which the plants are going to need. Apply the following in layers: 3" compost or decomposed manure or mud press, 2 lbs. wood ash, 2 lbs. bone meal, 2 lbs. fish meal or 2-4 kilos of dried Louisiana/lp11-lp11 leaves, and 2 lbs. of any of the following -- crushed egg shells, mussel shells, snail shells, etc. This is the required quantity for every 100 sq. ft. bed area.
4. Mix these plant foods thoroughly into the top 6" layer of the soil. Level the bed. It is then ready for planting.

Figure 1. Bed preparation for a Bio-Intensive Garden

for household level food production was developed, using limited garden space and locally available materials. However, special emphasis on knowledge-intensive methods and the sharing of these improved low-cost and ecologically sound technologies, referred to as the Bio-Intensive Gardening (BiG) approach

The Bio-intensive approach is a biological or organic (as opposed to chemical-based) form of agriculture in which a small area is intensively

cultivated, using natural ingredients to rebuild and then maintain the soil's productivity. At the heart of the approach is the effort to improve the soil's capability to nurture and sustain soil and plant life.

One of the first significant efforts to promote the Bio-intensive approach through site-research and publications was that of John Jeavons of Ecology Action, in California. What follows is the author's efforts over the past 12 years to apply and test those concepts and then develop additional options and technology transfer strategies for tropical conditions, given the limitations posed by the realities of working with poor, third world village communities

Technological profile

Bed Preparation

The Bio-intensive approach is initially more labour intensive than conventional approaches and is therefore best suited to small-scale, family centered food production in urban or rural settings. The main characteristic is the preparation of deep dug (12-24" depth) narrow and raised beds. Such beds are considered permanent and are expected to be used throughout the year. Initially, it takes 2-8 hours (depending on the method chosen) to prepare a standard plot of 25 ft. x 4 ft. The plots may be double-dug (i.e. 24") and while this is undoubtedly the most productive and appropriate way, it is less preferred by peasants who have not yet experienced the virtues of double-digging.



"After all, food is the most basic of basic essentials" (Photo: Julian Gonsalves)

The more popular plot preparation method among current adaptors was developed by the farmers together with the IIRR team in the Philippines and is a single-dug, raised, narrow plot, only about 12-14" deep using standard digging procedures (Fig.1) and making use of locally available materials. The plots however are located in a permanent site with fixed pathways to eliminate stepping on the plots once they are dug. Of critical importance is the need to keep the plot constantly covered with crops or, if no water is available during some part of the year, to maintain a 4-6" thick layer of dry straw/grass or other mulch materials. In the humid tropics, if this method is followed, after a relatively higher labour input one can begin to practice minimum tillage within a single season.

Bed Fertilization

Every bio-intensive gardener attempts to maximize the use of plant and animal residues and wastes. In an attempt to put back into the soil much of what comes out of it, material is recycled back into the soil through compost, green leaf manure, ashes, etc. To each plot of 100 sq. feet 8 cubic feet of decomposed manure or compost or green leaf manure (Green leaf manure as used in Bio-intensive gardens consists of leaves of any leguminous tree/shrub/annual.) or mudpress (by-product of sugar mills) is given. If the soil is exceptionally poor or sandy three times that quantity is recommended (only) the first time the bed is prepared.

Other materials required (per 100 sq. ft.) in the approach recommended by IIRR are 2 lbs. wood ash, 2 lbs. bone meal (only if it is available), 2 lbs. of either dried fish meal or dried leaves of any leguminous tree such as *Flamengia*, *Calliandra C.*, *Leucaena leucocephala* or *Gliricidia* and 2 lbs. of eggshells or seashells. Because of the high degree of humidity and the high temperature, these soil amendments are mixed into the top six inches (not shallower) of the soil and the plants/seeds are sown.

For areas where no compost or manure is available, green leaf manuring is recommended. This option based on an alley-cropping model (Fig. 2) proved to be an adequate alternative. The alternate rows of fast growing leguminous trees planted every 4-5 meters with two plots between them, have been found effective. However, the trees may be cut half a meter above ground level 3-4 times a year (each cutting should yield 10 kgs./row of green leaves) but only when the trees are at least one year old. Ash, eggshells, fish meal/dried leaves as explained earlier are added. However, such plots can not be sown until 2 weeks after the materials are incorporated into the soil.

Crop rotation and diversity

The bio-intensive gardens, as promoted by IIRR, emphasize the importance of relying primarily (for at least 7 out of 10 varieties used) on

indigenous varieties. Imported, improved varieties are used only if they have been in use in the area for 10 years, without the aid of heavy chemical inputs. This has been one key to explaining the success of the BIG programme in the Philippines, compared to previous efforts of the author in India and Tanzania. What's more important, it serves to demonstrate a tangible way of conserving seeds that the otherwise important seminars on genetic resources cannot ensure!!

Seeds that perform reasonably well under adverse conditions (e.g. cowpea or leafy amaranth from a previous season that continues to survive through the long summer) are of potential value. Other vegetables might not produce large, individual fruits but may be prolific and may yield produce over a longer period. Others are insect tolerant because of their hairy structures on leaf surfaces, etc.

A typical garden (Fig.3, photo) has four different crops per plot (legume, fruits, leafy and root). However, in practice gardeners tend to reduce this to 1-2 crops because of practical considerations. But diversity is an important factor in reducing the insect threat. This is achieved through relay cropping, intercropping and other mixed cropping systems preferred by gardeners. However, crop rotation (growing a different crops on the same spot after each other) is considered critical.

The plots are intensively sown, so that when the plants are fully grown, the soil is kept completely covered by the plant canopy, thereby eliminating weeds and reducing water evaporation from plot surfaces. To avoid weed growth and water losses when the plants are still young, the space in between is covered with an inch thick layer of dry mulch (e.g. straw). Additionally, the breakdown of this mulch contributes humus to the soil nurturing soil life. The soil

temperatures are reduced by 5 - 10 C and this in turn preserves microbial life and slows down the 'burning' of organic matter which is a serious problem in the hot, humid tropics.

Where summer seasons are harsh, a drought tolerant cover-crop is sown between the stubbles of the previous crop, without redigging the plot as such. In the humid tropics such as the Philippines, *Dolichos lab-lab* (Hyacinth bean) and Rice Bean have been found especially useful as a soil cover and green manure source. The seeds (soaked for 12 hrs) are immediately sown between the trash of the previous crop.

Pest Control

The use of predominantly indigenous or acclimatized varieties of vegetables, crop diversity, and good soil / water conditions result in little or no pest problems. However, virus in tomatoes, beetles on cucurbits and the moths on cabbage have been a regular problem without the use of some natural pesticides. No soil borne diseases such as Nematodes or Root rot have been experienced on the plots now used for 4 1/2 years. For commercial gardens, growing leafy vegetables under a screen-netting system has made it possible to raise lettuce, chinese cabbage, and other leafy vegetables without any natural or other sprays even in the summer (the net cuts down solar radiation). In the rainy season the net retains crop quality by protecting the plants from rain impact. The screens are placed onto the plots immediately upon transplanting seedlings and they are left there until harvest time 3-6 weeks later.

Use of liquid fertilizer

A major adaptation in IIRR's approach to BIG is the promotion and use of liquid fertilizer made from plant or animal wastes. 30-50 kgs. of weeds and manure is placed in a bag in a 50 gallon drum and the drum is filled with water. Three weeks later one part of the solution can be mixed with 4 parts

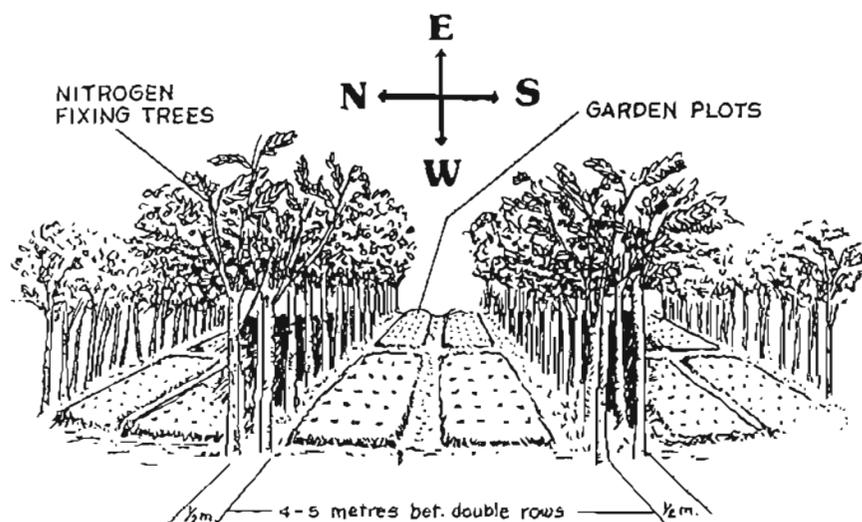


Figure 2. Integrated Alley Cropping Bio-Intensive Garden. Some potential tree hedgerow species: *Cajanus cajan*, *Gliricidia sepium*, *Leucaena leucocephala*, *Sesbania grandiflora*, *Calliandra calothyrsus*, *Flemengia species*.

