**Basic Cultural Management Practices for Urban Vegetable Production in the Philippines**

Like most cities in the tropics, Cagayan de Oro is located in the lowlands. Such locations place constraints on year-round vegetable production when compared to the rural highlands, due to the elevated night temperatures of 20°C and above, and the unfavourable biological, chemical and physical properties of soil and water.

Vegetable production in Cagayan de Oro can be classified into three categories (Potutan et al., 2000): (1) Commercial, on an overall area of about 60 ha (average farm size 0.5 ha), (2) Subsistence, in 40% of all households and in recently established allotment gardens; (3) School gardens in 75 out of 78 public schools. The most popular vegetables in the city in terms of consumption, are horseradish tree leaves (*Moringa oleifera*), eggplant (*Solanum melongena*), squash (*Cucurbita maxima*), string beans (*Vigna sesquipedalis*) and tomato (Agbayani, et al., 2001).

**CULTIVAR SELECTION**

Urban growers prefer to grow high-value crops that will provide a good return. However, most of these are temperate crops, only grow well in upland areas of the tropics, where temperatures are cooler. Continuous crop improvement by plant breeders has resulted in cultivars of these crops that perform well even in the hot climates of the tropical lowlands. Among those that were successfully tested and introduced in Cagayan de Oro, were cultivars ‘Busecorp 7’ for tomato, ‘Trinity’ for bell pepper, ‘White Shot’ for cauliflower and ‘Tenjiku’ for broccoli (Holmer, 2000).

**METHODS OF PLANTING VEGETABLE CROPS**

Vegetables can be classified into three categories depending on the planting practice: crops that are usually transplanted (e.g. cabbage, pepper, cauliflower, tomato, lettuce, eggplant); crops that are usually direct-seeded (e.g. melons, cucumber, beans, kangkong, onion, sweet corn); and crops that should be direct-seeded (radish, carrots). Direct seeding requires three to four times more seeds than transplanting. Some crops, such as legumes, do not easily regenerate roots, hence; do not easily recover from transplanting shock. The opposite can be said of solanaceous crops and crucifers.

Soil is the universally available medium for germinating seeds and growing seedlings, but not necessarily the best medium. In the urban setting of Cagayan de Oro, a mix of 2 parts rich top soil, 2 parts compost, 1 part chicken dung and 1 part river sand has been proven as best nursery medium for all vegetable crops.

**SOIL MANAGEMENT AND FERTILISERS**

Research under the PUVeP shows (Holmer, 1998; Trüggelmann et. al., 2000), that the best yield and quality results for vegetable production in Philippine soils are obtained, when a combination of organic and inorganic fertilizers is applied. Organic fertilizers such as manure and compost are needed to improve the biological, chemical and physical properties of the soil while inorganic fertilizers supply the required amount of nutrients. Organic fertilizers supply the same essential plant nutrients as inorganic fertilizers. The major difference is in their availability and concentration.

The best method is to apply all of the organic fertilizer, all of the phosphorus, and part of the other inorganic fertilizers into the soil just prior to planting. Fertilizers should be covered with a 3-4 cm layer of soil before setting the plants to avoid burning of the roots. One half of the nutrient amount for nitrogen and potassium K and other nutrients are applied one week after transplanting as first side dressing. The remaining balance is given two weeks thereafter (Holmer, 1998).

**WATER MANAGEMENT**

Proper water management is one of the most crucial points for successful vegetable production since most varieties are very sensitive to any kind of water stress, either to drought or to water logging.

If water is limited crops should be selected that will grow well under drier conditions.

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(e.g. mungbean, eggplant). Short-term vegetable crops can be grown near a source of water such as a water well, the drain from washing areas or a water tank. Where feasible and affordable, drip irrigation systems (such as the bucket system) could be used (Holmer & Schnitzer, 1997) to reduce water consumption. The soil around plants should be covered with a mulch of leaves, cut grass or rice straw. If plastic mulch is used, only silver-coated ones should be applied since black mulches heat up too much and can cause burning of stems and other plant parts. Young plants should be given shade to keep them cool. Compost or organic material should be incorporated in the soil to improve the water holding capacity of soil. One large sack of composted organic material should be sufficient for an area of about 10m².

In the wet season, crops should be planted in high beds to improve aeration and to avoid water logging. Another option would be to plant crops that grow well in wet conditions, such as taro (Colocasia esculenta) and kangkong (Ipomea aquatica). For controlling weeds, the ground could be covered with 6 cm of mulch to prevent weeds from receiving sunlight. Weeds cut by hoe or knife can be used as mulching material or for composting. Quick-growing vine plants will also reduce weeds by covering the ground. Examples are legumes, squash and sweet potato.

PESTS AND DISEASE MANAGEMENT
Findings of a survey revealed that more than 80% of vegetable growers in Cagayan de Oro are using chemical pesticides. Most of the farmers are not using sufficient protective devices while spraying and the majority of them are experiencing negative health effects after the pesticide application. Only very few farmers received training on integrated pest management. Of the farmer trained, only one-third changed their pesticide application practices to use less toxic products with better effects on pest control. Respondents would favour natural control measures with less chemical applications. However, these technologies are not as readily available to them as chemical pesticides. In addition, some of the non-chemical alternatives such as bacillus thuringiensis products or commercial neem extracts are more costly (Holmer et. al., 2001).

Weak plants suffer more from attacks by insects or pathogens than healthy plants. Good crop management, including attention to water, soil and weeds will help reduce damage from insects and pathogens. Furthermore, the cultivars used should be adapted to the local climate. Crop rotation based on differences in the botanical families of plants, will also prevent a build-up of disease and infection in the soil. Plants, such as lemon grass, basil, marigolds, and others are known to repel certain insects and other pests. If application of pesticides cannot be avoided, the instructions on the label have to be strictly followed. It must however be pointed out, that some “natural” pesticides such as tobacco, chilli extracts or others, can be very toxic to man, animals and beneficial insects.

REFERENCES
RUAIF, Leusden, Netherlands.

CONCLUSION
Growing vegetables in urban areas plays an important role in providing food, income, and ecological services to cities in the Philippines. Research to support urban agriculture is on going at universities, government and non-government organizations.

Priority areas on which further information is needed include:
❖ Improved vegetable varieties with adaptation to the tropical lowland climates, resistance to pests and pathogens, higher nutrition values, and longer shelf life;
❖ Technologies for composting biodegradable city wastes,
❖ Integrated crop management including the introduction of local predators; intercropping technologies and soil mulch for weed control. The objective is to minimize the application of chemical pesticides in densely populated areas;

❖ Efficient and economic irrigation systems such as the bucket drip irrigation system which minimises water requirements
❖ Safe use of wastewater for irrigation.

At the heart of urban agriculture lie the livelihoods of farmers, food security, and ecological and social sustainability. Any crop production paradigm or technology should result in these benefits. Farmers need to be educated and encouraged to make the best choices that suit local conditions.