

## Cropping 101

Prepared by Mark Bell, Amanda Crump, Nick Madden and Maria Paz Santibanez 2012

For more information visit: International Programs [ip.ucdavis.edu](http://ip.ucdavis.edu)

This overview provides summaries of

1. Key Factors in Cropping and Why They are Important
2. Major Characteristics of Cool and Warm Season Vegetables
3. Simple Diagnostic Observations



### 1. Key Factors in Cropping and Why They are Important

The major production factors are:

- Crop Selection
- Variety
- Land Preparation and Land Leveling
- Seed Quality
- Crop Establishment (Method & Date)
- Weed Control
- Diseases
- Insects
- Other Pests
- Water Management
- Nutrient Management and Fertilizer Application

**Note: Timing of an operation is often as important as what is actually done**



#### **Crop Selection - What crops can I grow?**

Weather (temperature and rainfall), irrigation and soil type are critical to what can grow. Market demand, seed availability, product storage and social preference then determine what is actually grown by farmers.



**Variety** (for any given crop – e.g. wheat - there are different types)

**The variety grown determines potential yield and product quality** (e.g. color, cooking and eating characteristics). Variety also determines crop maturity (when it should be planted and harvested), plus resistance and tolerance to

insect and disease pests.



### **Land Preparation**

**Land preparation is important for its effect on seed bed quality – you want good seed-soil contact.** Good land preparation reduces weeds, improves crop stand, breaks-down crop residues and leaves land level for better irrigation. A good seedbed has a range of soil clods about the same

size as the seed.



### **Seed Quality**

Good seed is genetically uniform with good germination and vigor. Good seed is full, uniform in size, free of insects and diseases, produces a vigorous crop and increases yields.



### **Crop Establishment (Method & Date)**

**Good plant stand is the basis for high yields**

and depends on seedbed quality (soil clods about the same size as seed), seed quality (good germination etc.), planting method and conditions at planting (moisture and temperature) and crop. Mechanical planting in rows can lower seed rates and give more uniform crop establishment.

Sometimes seeds are planted on raised beds – usually to facilitate flood irrigation or other farm operations (e.g. cultivating with an animal or tractor).

Planting rate depends on the crop, the seed quality and the target plant stand for the season and location.



### **Weed Control**

**Weeds compete with the crop for nutrients and water and can reduce product quality.** Early

weed control is critical. Weeds are usually directly controlled by hand weeding or chemical control. Good land preparation, crop rotation, timely planting after land preparation and mulching where appropriate (e.g. with small scale vegetables) can

reduce weed competition with the crop. Weeding is often the most labor intensive operation on a farm.



### Diseases

**Diseases can reduce leaf area and plant growth and can directly affect fruit and thus crop quality.** Diseases are often more important in weak or over fertilized crops.

Choosing a good resistant variety is one of the best strategies to control diseases.



### Insects

**Insects cause physical damage to the plant and fruit and can reduce crop stand and yields.** Insects can also spread disease.

Choosing a good resistant variety is one of the best strategies to reduce insect damage.



### Other Pests

**Pests such as rats and birds cause direct physical damage to the crop.** Rats can also spread human diseases. Other animals (e.g. cattle and goats) can be pests if grazing is not controlled.



### Safe Applications

**Safe applications are important for the safety of the person applying, the environment and the consumer.**

The right product needs to be applied at the right time and dose. Workers and crop need to be protected from possible side effects.

A common problem in some countries is that the product is ineffective as the product sold is not what is indicated on the label.



### **Water Management**

**Under and over irrigating can cause yield losses.**

Irrigate to the depth of rooting and to avoid the crop wilting. A rule of thumb is that roots in annual crops will be approximately as deep as the crop is tall.



### **Nutrient Management**

**Sixteen Nutrients are required for healthy growth.** Both deficiencies (quite common) and toxicities (less common) can reduce plant yields. The crop gets most of its nutrients from the soil, but nitrogen, phosphorus and potassium are often limiting.

Nutrients can be applied organically & inorganically. Apply when crop needs (usually early in crop growth).

Note: Organic material like Chicken manure has 2% N. Urea has 45% N. If the crop needs 90 kg N, then need 200 kg Urea, or 4,500 kg Chicken manure (about the annual production from 50 chickens).

A common problem in some countries is that the fertilizer is ineffective as the product sold is not what is indicated on the label.

### **Harvest and postharvest – what happens during and after harvest?**



#### **Harvest**

**High or low air moisture and high temperatures can reduce product quality and lead to product loss.** With very dry air, perishable products such as fruits dry and shrivel. Very moist air can lead to rotting and disease. To get the best quality product, harvest when mature and limit physical damage. If possible, harvest perishable

goods (fruits and vegetables) in the morning when cool, keep harvested fruit and vegetables cool and in the shade (if possible)

## Post-harvest (storage, drying, transport, processing)

As for freshly harvested products, high or low air moisture and high temperatures can reduce product quality. Keep perishable products cool. Pack and handle carefully to avoid physical damage. Some products (e.g. wheat) need to be dried quickly to avoid growth of fungus.



Cleaning grain by wind



Grain storage



Drying apricots



### Marketing

Markets and access to markets determine price, crop options and incentives to invest in a crop.

## 2. Major Characteristics of Warm and Cool Season Vegetables

Warm Season	Cool Season
Optimum growth 18 – 30°C (>25)	Optimum growth 10 – 18°C (<25)
Deep rooted	Shallow rooted
Eat fruit part	Eat leaf, stem, root (vegetative part)
Store at 5-10°C	Store at 0-5°C
Not tolerant of frost	Frost tolerant
Irrigate more deeply	Irrigate less deeply
<b>Example crops</b> beans, corn (maize), eggplant, melon, okra, pepper, tomato	<b>Example crops</b> carrot, garlic, lettuce, onion, potato, spinach

### 3. Diagnostics 101

**Check crop uniformity (color, height, crop stand) as the first key factor to diagnostics.**

#### What to look for

Factor	What to check
<b>Varietal purity</b>	Uniformity of crop (color, height, fruit type).
<b>Land preparation</b>	Seedbed quality – avoid large clods. You want no weeds and a range of soil clods about the same size as the seed.
<b>Land leveling</b>	High spots don't get much water – low spots may get too much water.
<b>Seed quality</b>	Good seed = uniform genetic material, high germination and vigor and free of weed seeds, insects and diseases.
<b>Crop establishment</b>	Look for a uniform plant stand of uniform distribution and similar plant height. Check date and expected maturity of the variety to avoid early or late season stress (moisture or temperature).
<b>Weed control</b>	Weeds need to be controlled early.
<b>Diseases</b>	Look for evidence of rotting or physical evidence of the disease (e.g. fungus, bacteria or viruses).
<b>Insects</b>	Can cause physical damage and sometimes spread disease.
<b>Other pests</b>	Rats and birds can often cause damage.
<b>Water management</b>	Avoid excess or insufficient moisture. Check soil moisture by look and feel. The crop is permanently damaged if the plants wilt and do not recover by the next morning.
<b>Nutrient management</b>	Check yield and how much nutrient is required to get the desired yield. Most deficiencies and toxicities have specific symptoms – usually associated with a color change of the plant.
<b>Harvest and post-harvest</b>	Product needs to be protected from high temperatures. Too much moisture can lead to disease. Too low can dry out perishable products.
<b>Safe applications</b>	Agro chemical application practices are often very poor and a problem for worker, environmental and food safety.
<b>Economics and markets</b>	Consider the cost of and access to inputs relative to the expected market return.



A leaf showing nutrient deficiency symptoms.