



Edible Landscaping

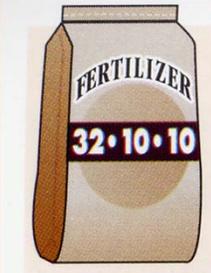
Planting & Maintenance
Pest Management

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The slide features a green border and a background with stylized green plants and a vertical line of small orange flowers. The title 'Edible Landscaping' is in a large, purple, cursive font. Below it, 'Planting & Maintenance' is in a smaller, brown, sans-serif font, and 'Pest Management' is in a brown, italicized, sans-serif font. The presenter's name and contact information are in the bottom right corner.

Step 1: Prevention!

- Choose well-adapted/low pest species & varieties
- Plant at the right time to avoid stress - Goldilocks
- Avoid over-fertilization and overwatering
- Weed control – use of mulches, limited or no use of herbicides
- Rotate when possible (annuals only of course)
- Learn to recognize, and provide safe haven for beneficials



The slide contains a list of six prevention tips. To the right of the list is a photograph of a ladybug on a green leaf. Below the list are three smaller images: a bag of fertilizer labeled 'FERTILIZER 32-10-10', a pair of hands in white gloves planting a seedling in the soil, and a close-up of a dark, spiny beneficial insect on a leaf.

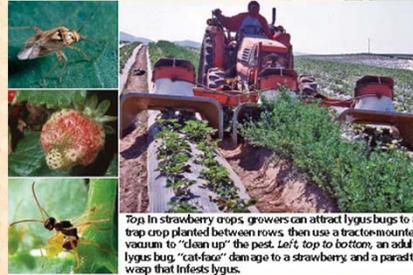
Companion Planting

- Limited research – based information
 - Basic concept: some plants can benefit other plants when grown in near proximity.
- Potential benefits:
 - Cultural - modify the immediate environment so that a plant can flourish.
 - Produce shade for lower growing shade tolerant species
 - Corn and squash – said to disorient the adult squash vine borer



Companion Planting

- Trap cropping
 - Strawberries and Lygus bug
 - Shasta Daisy
 - Radish, alyssum, alfalfa
 - Vacuum cleaner
- Biochemical pest suppression
 - Do marigolds provide suppression of root lesion and root-knot nematode?
 - Certain varieties of French dwarf, African, and South American do, when grown as a cover crop
 - Intercropping with marigolds is not effective



Companion Planting

- Beneficial insect habitat
 - Hedgerow research provides some key plants
 - California buckwheat, coyote brush, elderberry, coffeeberry, toyon and California lilac (Ceonothus)
 - Bloom, when nectar and pollen are available
- Security through diversity



Green Lacewing



Companion Planting – Challenges with extending science

- Tomato and Borage “Controls worms” but which one?
 - From UC IPM
 - Beet armyworm
 - Hornworms
 - Loopers
 - Potato tuberworm
 - Tomato fruitworm
 - Tomato pinworm
 - Anecdotally, confuses the Sphinx moth and prevents egg-laying



Do You Have a Pest? Is it a Problem?

- Identification - Vigilance!
- Assess damage, determine action to take -if any
 - Cultural and Mechanical Controls
 - Conservation of Biological Controls
 - Chemical controls as a last resort



Integrated Pest Management

www.ipm.ucdavis.edu

How to Manage Pests
Pests in Gardens and Landscapes—Vegetables and Melons

Search vegetables:

Vegetables and melons

- [Artichokes](#)
- [Asparagus](#)
- [Beans](#)
- [Broccoli](#)
- [Brussels sprouts](#)
- [Cabbage](#)
- [Cantaloupe](#)
- [Carrots](#)
- [Cauliflower](#)
- [Corn](#)
- [Cucumbers](#)
- [Eggplant](#)
- [Lettuce](#)
- [Onions and garlic](#)
- [Peas](#)
- [Peppers](#)
- [Potatoes](#)
- [Pumpkins](#)
- [Spinach](#)
- [Squash](#)
- [Tomatoes](#)
- [Watermelon](#)

If All Else Fails...

- Additional Considerations
 - Pesticide and Label Information
 - For edible plants
 - Limited number of applications per year
 - PHI – Pre-Harvest Interval
 - For ornamental plants
 - May or may not limit applications per year
 - Generally do not include PHI

Pesticides in Edible Landscapes

- Pay attention to label!
 - Directions for application to ornamentals can be very different
 - No pre-harvest intervals
- Example Label for ornamental plants - spinosad

Outdoor Ornamentals (herbaceous and woody plants)	Gall midges Leaf feeding beetles Leafminers Sawfly larvae Spider mites Worms, including Loopers, webworms, Bagworms, gypsy Moth, and tent caterpillars	Mix the amount of concentrated pesticide recommended per pint, quart or gallon of spray and uniformly spray foliage to point of runoff. Uniform coverage of upper and lower leaf surfaces is essential for effective insect control
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- Drift/Runoff from ornamentals to edibles

If All Else Fails...

- Pay attention to label!
 - Applications per Season
 - Minimum Days to Reapply
 - Pre-harvest Intervals
- Example Label for edible plants - spinosad

Crops	Pests Controlled	Minimum Days To Wait From Last Application To Harvest
Cucurbits including cucumber, summer and winter squash, muskmelons (cantaloupe, honeydew, etc.) pumpkin, edible gourds, and watermelon	Leafminers Thrips Worms (caterpillars)	All except cucumber 3 days Cucumber 1 days

Pest Management Resources

- UC Integrated Pest Management web resources
 - <http://www.ipm.ucdavis.edu>

Edible Landscaping

Planting & Maintenance
Organic vs. Inorganic Fertilizers

Chuck Ingels
UC Cooperative Extension

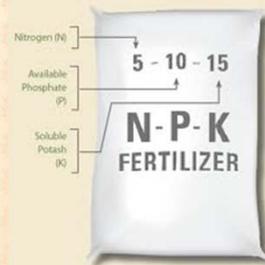
Chemical vs. Organic Fertilization

- Plants take up nutrients from organic and chemical sources (no preference)
- Organic fertilizers feed soil microbes and require them for breakdown (“Feed the soil”)
- Microbes convert nutrients from organic form into a plant-available (soluble) form



The Numbers

- “Essentials” N-P-K
 - Nitrogen
 - Phosphorous
 - Potassium
- “Micro-nutrients” are just as essential
 - Carbon
 - Hydrogen
 - Oxygen
 - Magnesium
 - Calcium
 - Etc!



Chemical Fertilizers



Advantages of Chemical Fertilizers

- Nutrients available to plants immediately
- Produce exact ratio of nutrients desired
- Ratios and chemical sources easy to understand
- Relatively inexpensive (your dollars today)



Disadvantages of Chemical Fertilizers

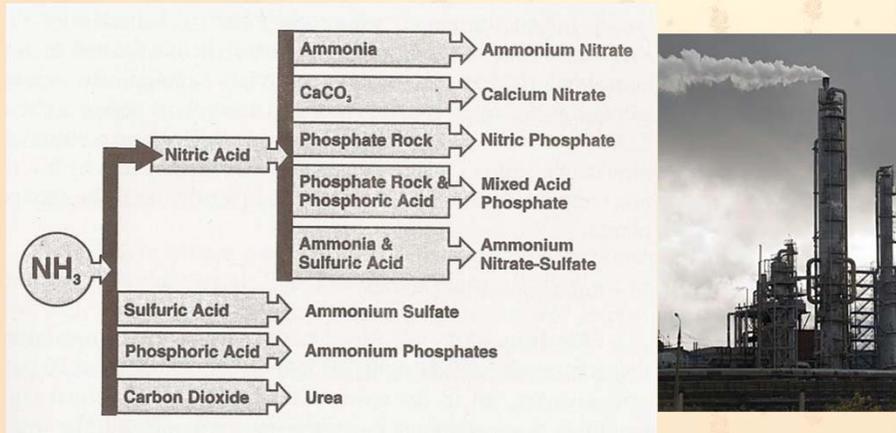
- Made from nonrenewable sources (fossil fuels)
 - Expensive from environmental standpoint
- May not promote soil health
 - No decaying matter for improving soil structure
 - Most do not provide micronutrients
- Nutrients readily available → chance of overfert.
 - Nutrient runoff into environment
- Tend to leach faster than organic
- Long-term use can change soil pH, harm soil microbes, increase pests

Making Chemical Nitrogen Fertilizers

- Natural gas = 98% methane (CH_4)
- Chemical reactions → hydrogen gas (H_2)
- Makes ammonia (NH_3), energy intensive
- Compressed into liquid = Anhydrous ammonia

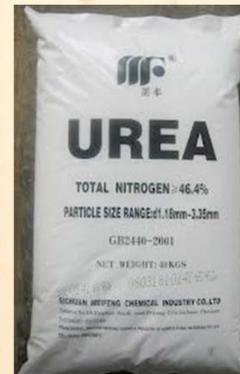


Conversions of Ammonia to Various Nitrogen Fertilizers



Examples of Chemical Nitrogen Fertilizers

- Ammonium sulfate (21-0-0-24S)
- Ammonium nitrate (34-0-0)
- Urea (46-0-0)
 - Highest % N; protein substitute in animal feeds



Organic Fertilizers



Advantages of Organic Fertilizers

- May improve soil structure
- Most are slow-release; not easy to overfertilize
- Renewable and biodegradable
- Can make your own from waste (compost, worm castings) or obtain locally (manure)



Disadvantages of Organic Fertilizers

- May not release nutrients as they are needed
- Nutrient content of manure & compost often unknown
- % N-P-K usually lower than chemical fertilizers
- Tend to be bulkier, requiring more fossil fuels; more expensive



Animal-Based Organic Fertilizers

- Animals killed
 - Blood meal (12-0-0)
 - Bone meal (1-13-0 to 4-12-0, +22% Ca)
 - Feather meal (12-0-0)
 - Fish products (4% to 11% N)
- Animals not killed
 - Bat guano (3% to 10% N, up to 12% P, 1% K)
 - Manure/compost (1% to 4% N)



Plant-Based Organic Fertilizers

- Alfalfa meal (about 2-1-2)
- Cottonseed meal (about 6-2-1)
- Soybean meal (7-2-1)
- Kelp/seaweed (used for micronutrients, hormones, vitamins, and enzymes)
- Humic acid and humate products (touted to enhance soil microbes)



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Mined Organic Fertilizers

- Soft rock phosphate (16% P and 19% Ca)
 - Natural deposits in N. America, China, Morocco, & former Soviet Union
- Potassium
 - Muriate of potash
 - Sulfate of potash
 - Greensand



Mining of Potassium Fertilizers

- World reserves deposited when water from ancient inland oceans evaporated
 - Covered by thousands of feet of soil
- Most deposits chloride (KCl), some sulfate (K_2SO_4)
- From Canada (#1), Russia, Belarus, US (#7)
 - New Mexico, Utah, Canada



Compost Characteristics and Uses

- Contains most nutrients required by plants
- May contain weeds & plant pathogens
- N content usually about 1-1.5%, very slow release
- Usually considered a soil amendment, not fertilizer



Available N from Manures, Compost Decay Study

- UC research, 1970s
- Average plant-available N over 3 years (years 1, 2, & 3):
 - Chicken (90%, 10%, 5%)
 - Dairy (75%, 15%, 10%)
 - Feedlot (35%, 15%, 10%)
 - Compost (~10% in year 1)



Nutrient Costs of Selected Fertilizers Local Nurseries, January 2011

Product	Analysis	\$/Lb. of N (3-5 lb. bag/box)
<u>CHEMICAL</u>		
Azalea/Camellia	4-8-5	\$6.46
Rose	5-10-5	\$5.49
Multi-Purpose	16-16-16	\$2.29
Citrus	12-8-4	\$4.58
<u>"NATURAL" BRAND</u>		
Azalea/Camellia	4-5-4	\$17.31
Rose	5-7-2	\$16.07
Mult-Purpose	4-4-4	\$18.75
Citrus	7-3-3	\$11.25

Nutrient Costs of Selected Fertilizers Local Nursery vs. Peaceful Valley Farm Supply (Box vs. Bulk)

Product	Analysis	\$/Lb. N
<u>NURSERY (3.0 to 3.5 lb.)</u>		
Alfalfa meal	4-8-5	\$40.00
Blood meal	13-0-0	\$16.81
Cottonseed meal	5-2-1	\$21.43
Bat guano (1.5 lb.)	10-3-1	\$38.10
<u>PVFS (50 lb.)</u>		
Alfalfa meal	2.4-0-0	\$18.33
Blood meal	13-0-0	\$9.23
Cottonseed meal	6-2.5-1	\$7.37
Bat guano (25 lb.)	10-6-2	\$16.66

Nutri-Rich Pelleted chicken manure 4-3-3



Questions?



(c) Kathy Keatley Garvey