Crop Productivity and Biological Diversity

It is currently unknown, to what extent can biological diversity be diminished on earth before crop productivity and our quality of life is affected. Certainly all living species are interrelated, and in cases, the disappearance of a single species may have a significant long-lasting effect on an ecosystem. Biological diversity is even more important for agriculturists whom rely on arthropods and microorganism for nutrient cycling, pollination, and biological control. Here are a few facts related to biological diversity.

◊ World biota= 10 million (range= 2-80 million) species of plants and animals
◊ Arthropods make up approximately 90% of all species.
◊ Approx. 50% of terrestrial area is devoted to agriculture, 20% to commercial forests, 25% to human settlements; 5% unmanaged and inhospitable.
◊ Depletion of natural resources is correlated with reduction in biological diversity. Developed countries use 100- to 600- fold more resources per capita than developing countries.
◊ An estimated $50 billion of N is supplied annually to world agriculture by N-fixing organisms ($7 billion in the US).
◊ Species diversity is maintained with an abundance in biomass, plant species diversity, habitat diversity, large areas, stable ecosystems, soil fertility, soil quality, nutrient, water and energy cycling, abundant water, and favorable climates.

(Pimentel et al., BioScience 42:354(1992))

Insect populations in diversified soybean plots

The presence of grassy corridors in soybean resulted in reduced number of leaf and stem sucking insects, but had no effect on defoliators. Predators were more abundant in grassy corridors than in controls (bare ground alone or bare ground plus Carbaryl insecticide). Despite the differences in insect dynamics, yields were not affected by treatments (Rodenhouse et al., Agric. Ecos. Environ. 38,179 (1992)).

Neem Tree Highlights

• Controls more than 200 insect species
• Active ingredient is azadirachtin
• Mode of action- insect growth regulator: blocks ecdysone and inhibits chitin formation.
• Neem based pesticides=
  1) Margosan-O (currently for ornamentals in greenhouses, commercial nurseries); and
  2) Azatin (AgriDyne Technologies), controls insects at larval and pupal stages). Control greenhouse and sweetpotato whiteflies and leafminers.
• No re-entry restrictions for either Margosan-O or Azatin.
• Neem oil has shown preventative fungistatic activity against several bean rust races (possibly due to its high sulfur content).
• Other neem compounds fight tooth decay, viruses, and a variety of bacteria.
• Neem-based toothpaste is already found in Asian supermarkets.
• Potential disadvantage: biocontrol agents with similar modes of action, such as Dimilin, are extremely toxic to all crustaceans, and its use may thus be risky in fields close to aquatic habitats

(Ag. Consultant, April 1992; Science Jan 17 and May 2, 1992).
Research Directives in the Continental US

Down South (Veggies)

A. Cultural Aspects (C.S. Vavrina and T.A. Obreza, Univ. Florida Immokalee)

1. Transplant Production- cultural aspects of growing, fertilizing, and finishing transplants
2. Stand establishment
3. Biostimulant/Foliar nutritional testing
4. Fertilizer type and placement
5. Variety testing
6. Drip Irrigation management
7. Summer cover crops on soil and nutrient-holding capacity for winter vegetables
8. Solid waste potential for vegetables on sandy soils (pers. comm.).

B. Pests and Diseases (P. Stansly and R.J. McGovern, Univ. Florida, Immokalee)

1. Thrips palmi on peppers and cucurbits
2. Beneficials for sweetpotato whitefly
3. Fusarium crown and root rot of tomato- management to control soil born diseases (Bravo outperformed all fungicides in controlling gummy stem blight and downy mildew on cantaloupe, and early blight on tomato; applications of bicarbonates failed to reduce these diseases.)
4. Tobacco Mottle Geminivirus- weed hosts range and epidemiological
5. Closteroviruses- basic biology on tomato and peppers
6. Tomato virus survey- determine virus incidence an prevalence in Ruskin-Palmetto and Immokalee-Naples areas.
7. Pesticide Evaluations (pers. comm.)

Down West (Asparagus)

Washington State Asparagus Commission, 1992 Research Priorities

Pesticide development, preventing soft spots on asparagus spears during processing and containing labor costs have been identified as the three most important research needs to be addressed in 1992 by the Washington Asparagus Commission. 1992 Budget Research for the Commission is $100,000. The commission is assisting in establishing a quality control center in the tri-cities area of Pasco, Kennewick and Richland and working with a Washington State University research advisory committee. The commission was formed by the state's 490 asparagus growers in March of 1991. Nine commissioners were elected, and three committees formed to deal with promotion, trade, and research, respectively (The Packer, April 11, 1992).

Growth Regulators Factoids

◊ Gibberelic acid on citrus has been used to delay fruit maturation in lemons, delay the aging of navel orange rinds, and extend the pre- and post-harvest life of Minneola tangelos.
◊ Gibberelic acid is now used on about 70% of the 110,000 acres of navel oranges in California.

Soil Quality Review

Characteristics of a Productive Soil

◊ Rich in nutrients
◊ High in organic matter (2-15%) 
◊ Store soil moisture (20% by weight)
◊ Well drained
◊ Has an abundant biota 
(Pimentel et al., BioScience 42:354(1992))

What about Earthworms

The soil of a heavily fertilized rye grass (Lolium) field kept earthworm-free for 20 years through the use of phorate had the following characteristics compared to untreated soils:

Increased:
◊ soil bulk density ◊ shear strength
◊ penetrability ◊ depth of leaf litter

Decreased:
◊ soil organic matter ◊ initial infiltration rate
◊ soil pH ◊ soil moisture content 
(Clemens et al., Agr. Ecos. Environ. 36:75(1991)).

Green manure in Germany

The addition of green manure for over 100 years compared to unfertilized plots resulted in:

◊ increased soil organic matter associated with the fine and medium silt fractions.
◊ Increased soil enrichment with organic matter was due to an increase in lignin building blocks, which reflects an increase in lipids such as fatty acids in the silt fractions (Biol. Fertil. Soil. 12:81(1991)).

Rodent-Free Soils?

Three days trapping every month for 1 year controlled rodent population activity in tomato, pea, cauliflower, cabbage, and beans. Control was effective up to six months after control measures had terminated. The study used wonder traps and wooden box type traps with a spring-loaded door operated by a hook. No crop yield data was presented (Sheikher and Jain, Trop. Pest Mgmt. 38,103(1992).

Sustainable Ag Coalition Forms

A network of organizations recently formed the Illinois Sustainable Ag. Network. Activities will include on-farm research, field demonstrations, workshops, publications, regional meetings and serve as a farmer communication network (Alt Ag. News, April '92).

Pesticide Exposure Factoid

The EPA estimates that up to 300,000 hired farm workers are exposed to pesticides resulting in acute illnesses an injuries (Alt Ag News April '92).
Resistence to Sweet Potato Weevil
A cultivar trial was conducted in Leon County, Florida to determine resistance against the sweet potato weevil. Results:
- 'Regal' showed the highest resistance to weevil damage, good yielder but poor keeper.
- 'Beauregard' had fast root development, was an excellent yielder/keeper but had some weevil damage (30%).
- 'Excel' is an excellent yielder, fair keeper, and moderate damage rates (65%).
- Other cultivars included 'Jewel' (standard), 'Southern Delight', and 'Sumor.' (Citrus & Veg. April 92).

Harvest Windows for Vegetables
Narrow harvest window (one day): sweet corn, summer squash, snap beans, cucumbers, broccoli.
Medium window (a few days): tomatoes, peppers, cauliflower, strawberries.
Wide window (> 1 week): potatoes, cabbage, carrots, celery, watermelons, and avocados. (Citrus & Veg. April 92).

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<tr>
<th>Vegetable Crops for which Hybrids now Exist</th>
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<tbody>
<tr>
<td>Sweet corn</td>
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<td>Tomato</td>
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<td>Cabbage</td>
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<td>Chinese cabbage</td>
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<td>Brussel sprouts</td>
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<td>Carrots</td>
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The Marketing Corner

Value-added Packaging Innovations

◊ Leafsies. Precut produce sales are gaining popularity in the U.S., while they are already well established in the European market. Examples of precut packages available in the U.S. include triple-washed spinach, tossed salad, and cole slaw mixes.

◊ Berries. Well-Pict Inc. recently introduced an oval-shaped, see through container which holds 10-11 oz of strawberries, with the company label sticker on top. Ten baskets are placed in each case, and the cases fit in 40 x 40 in pallets (Packer, March 28, 1992).

◊ Onion. G&R Farms in Glenville, Georgia introduced 25-, 50- and later 10-pound cartons for sweet vidalia onions. Advantages include ease of palletizing, less bruising, and promotional displays can be pre-printed in the cartons. Another firm, R.L. Cato may increase its use of onion cartons to 40%, up from 15% last year (The Packer, April 11, 1992).

◊ Carrots. 1- and 2- pound packs of peeled baby carrots are taking over the market for 1- and 2- lb cello carrot packages in some California markets. Industry sales increased by 30% in 1992 (The Packer, April 25, 1992).

◊ Eat Smart Recipe Wrap
Apio Produce Sales’ innovative individualized cauliflower wrapper includes nutritional information, the company’s “Irish Spring” logo, healthy microwaveable recipes, and a toll-free consumer number. The company plans to extent its cauliflower wrap to cello lettuce and sleeved celery in the near future (Am. Veg. Grower 40:44(1992).

◊ Microwave Verdelli Style
Verdelli Farms Inc., an innovative enterprise in Hummelstown, Pennsylvania, recently moved into pre-packed microwavable veggies with a 12 ounce mix of cauliflower, carrots and broccoli in a dual-ovenable C-PET tray. The wrapping material, Cryovac RD-106 shrink film, breathes to match tissue respiration rates and prevents excess oxygen infiltration. The vegetables are hand-placed in the trays and the clear film labeled with a bright, colorful Verdelli logo. Trays are then conveyed through a Weldotron 1601 automatic shrink-wrapping machine, film wrapped, and sealed at the front and back. Insulation provided by the film and tray, prevent excessive heat exposure on the produce. Packages are placed in heavyweight paper-board cartons, four to a carton (Packaging 5-92).

Avocados

Welcome the newest member of the Vegetable Family
Supreme Court 1893 and 1895 decisions stated that products should be classified as they are traded, regulated and controlled in the marketplace, and not based on botanical classification. USC and UCLA teams presented their cases concerning avocado in an April 1992 promotional debate. Doug Llewelyn’s (The People’s Court) ruling: Give up doc: it’s a veggie (Packer, 25 Apr. 92).

Organizing Your Daily Activities

The Fluid Theory of Time Management

Time management for most of us earthly beings probably means answering phone calls, letters, writing reports, taking care of brush fires, talking with colleagues, looking at bugs in the field, and then maybe some time to scan headlines from a pile of trade journals in our desk. But, in the business world, how do successful managers deal with the demanding schedule of leading multi-billion dollar transnationals with thousands of employees world wide? Do they have rigid schedules with half-hour appointments from sunrise to dawn?

Surprisingly, top CEOs follow what would appear to be somewhat of an anarchic schedule, with lots of open space and unstructured time for small conversation and to deal with the daily vagaries of business. This seemingly haphazard strategy allows them to get up-to-the-minute information and to maintain personal ties necessary to run a large company. In general, out of a 10 hour working day, only 2 hours will consist of pre-arranged appointments. In fact most CEOs come to work every morning with little idea of what’s up for the day, relying on simply “whatever comes next.” So all of this brief interruptions throughout the day are not considered interruptions as such, but more so part of the work day itself, maintaining lines of communication open that promote accessibility and creativity in the workplace. This approach is referred to as the fluid-theory of time management (Fortune, June 1, 1992).
A day in the life of a top Chief Executive Officer (CEO)

◊ 49% of daily encounters last less than 9 minutes
◊ 78% of time spent talking to other people
◊ Most of their time is not planned in advance
◊ In their conversations, ask a lot of questions, and rarely give direct orders or make big decisions.
◊ The brief conversations go "all over the place." Ten unrelated topics may be brought up in 5 minutes. Much of the friendly talk has little to do with work (Fortune June 1, 1992).

UPCOMING EVENTS


Cold Ag Workshop, Kona Hilton, Kailua, Kona 28-29 July, 1992. The use of "low cost" deep ocean water for production, and postharvest handling of temperate crops. For registration ($75) contact Barbara Lee, POB 5475, Kailua-Kona 96745, tel/fax 329-7452

Waimanalo Sweet Corn Field Day 8 August, 1992. Jim Brewbaker will be hosting a field day to introduce Waimanalo's Supersweet, his new sweet corn hybrid.


Brighton Crop Protection Conf.: Pests and Diseases., 23-26 Nov., 1992. 1700 average attendance from over 60 countries. Contact John North, 49 Downing St., Farnham, Surry GUP 7PH. Tel. 0252-733072.


International Conf. on the Experience of Integrated Resource Management for sustainable agriculture. Mid-September, 1993, Beijing, P.R. China. Contact Prof. Cheng Xu, Beijing Ag. Univ., Beijing, P.R. China, Tel. 86-1-258-2244 x. 271 or Fax 86-1-258-2332.

RESOURCES

Summer '92 Postharvest Biology and Technology of Horticultural Perishables. A course offered in 3 modules: 1) Study/tour of handling practices; 2) Scientific concepts; 3) Individual study. UC Davis. For information contact International Training and Ed. Ctr., UC, Davis, CA 95616-8727. Tel. 916-757-8686.


Literature Searches on Aquatic Plants. The Aquatic Plant Information Retrieval System of the Univ. Florida has a data base of over 31,000 aquatic plant research manuscripts. Literature searches may be requested by supplying key words to APIRS, 7922 NW 71st St., Gainesville, FL 32606, (904) 392-1799.

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