A. Ecological basis for using grasses as a living sod.

1. Grasses dominate in old field successions in Hawaii.
   a) Plant succession from a disturbed site to a biologically stable one.
      (1) Perennial grasses dominate after early succulent weedy stage and before woody shrubs and trees.
      (2) Grasses can add large amounts of organic matter, above and below the ground.

2. Since grasses occupy a long time period during old field succession, they also represent a stable community of plants, in terms of composition and density.

3. Plant succession in different climatic zones.
   a) Each distinct ecosystem has a climax species.
   b) Climax species and succession towards it are dependent on soil type, rainfall pattern and all other climatic variables.

B. Grassy sods for weed control in vegetable cropping systems

1. Energy options for weed control.
   a) Human labor for manual weed control
   b) Fossil fuel for tractors with mechanical cultivators
   c) Chemical energy to produce synthetic herbicides
   d) Solar energy to produce organic mulch for chemical and physical weed suppression.

2. Grass selections for living sods in vegetable crop production.
   a) Grasses usually constitute a more stable succession phase.
      (1) Perennial grass fits between vigorous succulent weeds and woody shrubs during succession
   b) Grass seed is usually cheaper than legume seeds
   c) Grasses are quick to germinate and can produce large amounts of biomass
d) Most vegetables are broad leaf plants; herbicides for grass control are currently available in many crops.

(1) POAST is labeled for use on over 32 different vegetable crops.

(\textit{a}) \textit{Vegetables on the Poast label include: artichoke, beans, tomatoes, peppers, eggplant, cantaloupe, cucumber, musk melon, pumpkin, summer squash, watermelon, winter squash, onions (bulb and green) potatoes (field and sweet), cabbage (bok choy, Chinese mustard, napa), broccoli, cauliflower, celery, head and leaf lettuce and spinach.}

(2) Fusilade 2000 (new product also listed as Fusilade DX) labeled on several fruit and vegetable crops.

(\textit{a}) \textit{Fusilade can be used on: carrots, dry bulb onions, garlic, endive, soybeans, sweet potatoes and yams.}

e) Grasses produce mulch, which then suppresses other plants with a combination of competitive and allelopathic influences.

(1) Grasses provide the mechanism for converting solar energy into weed controlling energy.

\textbf{C. POTENTIAL BENEFITS OF LIVING SODS}

1. Heavy grass cover can mask the presents of vegetable crops and reduce insect feeding.

\textbf{a) Grass and other upright ground covers can harbor spiders that limit insect spread.}

2. Grasses in general harbor fewer pathogenic nematode species than broadleaf plants. Non host grass roots in the same soil environment of susceptible crops provide opportunity for nematodes to select the wrong roots

3. In rainy weather, grasses keep nutrients at the soil surface and prevent leaching into the water table. Living sods also reduce rain splashing of the soil to reduce the spread of soil born diseases as well as reducing the need to wash fruits before sending them to market.

\textbf{a) Some grasses can promote beneficial root/microorganism associations.}

(1) Mychorrhizol fungi aid in P absorption

(2) antibiotic production in root rhizosphere

4. Living sods provide a protected microclimate for succulent transplants thus reducing shock from wind and intense sunlight.
5. An established grass sod allows for nutrient loading of a site with reduced potential for nutrient loss through erosion and downward leaching with heavy rainfall.

   a) Chemical nutrients applied to a grass sod are incorporated into plant tissues and are released during decomposition.

   b) Nutrients used to grow the grass sod are released to the crop whenever herbicides are used to stunt the sod.

6. Herbicide rates for stunting grass sods can be as low as half to a quarter of the recommended kill rates. Herbicides are applied to living grass as opposed to bare ground in conventional plantings; thus herbicide movement with runoff is greatly reduced.

   a) Grass species with greatest sensitivity to selective herbicides used as living sods to minimize chemical inputs.

**D. POTENTIAL PROBLEMS WITH LIVING MULCHES**

1. Dense sods that are a stunted produce a thick cover of dried grass that may present a fire hazard.

2. Restrictions on a days required after herbicide applications may result in over ripe fruits. Details are provided on product labels.

   a) Poast, interval from last application to harvest ranges from 7 days with artichoke to 60 days with sweet potatoes, most others in the 15-30 day range.

   b) Fusilade DX, preharvest interval ranges from 1 day for coffee to 55 days for sweet potatoes and yams.

3. Thick sods may mask the damage caused by soil rodents or chewing insects.

   a) Rodent populations can increase in grass due to protection from predators; rodents will eat more vegetable fruits in living sods because they can reach higher parts of the plant.

   b) Rodents are a real bad problem if direct seeding cucurbits into grass sods.

4. Shading and soil cooling caused by living sods may delay the fruiting of certain crops thus delaying the income generating phase of the crop cycle.

   a) Productive bearing life of crops can be extended because soil borne diseases are slowed due to cooler conditions and plants get larger before fruiting begins.