

Sustainable Farming Practices

Sustainable Farming Practices – Study Notes

1. What Is Sustainable Farming?

Definition	Goal
Farming that meets current food needs without compromising the ability of future generations to meet theirs.	• Preserve natural resources • Protect ecosystems • Maintain economic viability for producers • Support social well-being of farming communities

2. Core Principles

Principle	Key Actions
Soil Health	• Minimize tillage (no-till, reduced-till) • Use cover crops & green manures • Apply organic amendments (compost, manure)
Water Stewardship	• Drip/precision irrigation • Rainwater harvesting • Soil moisture monitoring
Biodiversity	• Crop rotation & intercropping • Preserve hedgerows, buffer strips, wetlands • Integrate livestock and pollinator habitats
Nutrient Management	• Soil testing & site-specific fertilization • Use of legumes for biological nitrogen fixation • Apply slow-release fertilizers
Integrated Pest Management (IPM)	• Scouting & pest thresholds • Biological control agents (beneficial insects, microbes) • Use of resistant varieties, trap crops
Energy Efficiency	• Renewable energy (solar, wind, biogas) • Efficient machinery & precision ag tech

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Principle

Key Actions

Economic Viability

- Diversified income streams (value-added products, agri-tourism)

Social Responsibility

- Market access (local, organic, fair-trade)
 - Fair labor practices
 - Community engagement & knowledge sharing
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3. Major Practices & Techniques

3.1. Conservation Tillage

- **No-till / Direct-seed:** Seeds placed directly into undisturbed soil.
- **Benefits:** Reduces erosion, improves organic matter, lowers fuel use.

3.2. Cover Crops & Green Manures

- **Examples:** Rye, clover, vetch, radish.
- **Functions:** Soil cover, nitrogen fixation, weed suppression, root biomass for soil structure.

3.3. Crop Rotation & Diversification

- **Typical Cycle:** Cereal ? Legume ? Brassica ? Fallow/cover crop.
- **Outcomes:** Breaks pest/disease cycles, balances nutrient demand.

3.4. Agroforestry

- **Systems:** Alley cropping, silvopasture, windbreaks.
- **Advantages:** Carbon sequestration, microclimate regulation, diversified products (timber, fruit, livestock).

3.5. Integrated Pest Management (IPM)

1. **Monitoring** – pheromone traps, visual scouting.
2. **Thresholds** – economic injury level decides when to act.

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3. **Controls** – cultural (crop timing), biological (predators/parasitoids), mechanical (row covers), chemical (targeted, low-toxicity pesticides only as last resort).

3.6. Precision Agriculture

- **Tools:** GPS-guided equipment, drones, soil moisture sensors, variable-rate applicators.
- **Result:** Input use (seed, fertilizer, water) matches exact field variability ? less waste, higher yields.

3.7. Water-Saving Technologies

- **Drip Irrigation:** Emits water at plant root zone, reduces evaporation.
- **Subsurface Irrigation:** Tubes buried below soil surface, further cuts loss.
- **Smart Controllers:** Adjust schedules based on weather forecasts and soil data.