

Class 03: Sustainable Crop Management

QUESTIONS

1. How can we **increase soil organic matter (SOM)**?
2. How can we **optimize water use**?
3. Which **crop management practices** help **adapt agriculture to climate change**?
4. Why is **biodiversity conservation** in agricultural systems **crucial** for sustainable crop management?

ANSWERS

A1. Increasing soil organic matter (SOM)

- **High-quality organic inputs:** well-matured compost, stabilized manure/digestate; rate based on soil tests.
- **Cover crops / green manures:** legumes and legume–grass mixes for biomass and N; roll or incorporate.
- **Residue retention:** keep crop residues on the field (where disease pressure allows).
- **Reduced tillage / no-till:** limit mineralization and protect aggregates.
- **Diverse rotations:** alternate botanical families to support soil food webs.
- **Structural amendments:** woody composts, ramial chipped wood; **biochar** when economically justified.
- **Balance pH & nutrients:** correct acidity to favor microbial activity.

A2. Optimizing water use

- **Localized irrigation** (drip/micro-sprinklers) with **scheduling** by crop stage and ET.
- **Soil moisture monitoring:** capacitance probes, tensiometers, water balance irrigate on demand.
- **Mulching** to cut evaporation; **cool-hour irrigation** (early/late) and **split applications**.
- **Enhance infiltration** via SOM and good soil structure.
- **Rainwater harvesting & storage;** safe reuse of non-conventional water where permitted.

- **Adapt varieties and plant density** to water constraints; **weed control** to reduce competition.

A3. Climate-change adaptation practices

- **Tolerant varieties** (drought, heat, salinity, emerging pests).
- **Shifted calendars:** sowing/harvest dates aligned with local forecasts.
- **Soil conservation:** permanent cover, reduced tillage, SOM to boost water holding capacity.
- **Water management:** efficient irrigation, drainage where needed, on-farm storage.
- **Diversification & agroforestry:** spread risks, create protective microclimates, wind-breaks.
- **Monitoring & early warning:** traps, phenology models, weather advisories.
- **Plant health/IPM:** biocontrol and targeted interventions to reduce climate-amplified losses.

A4. Why biodiversity matters

- **Resilience** to shocks (droughts, pests, diseases).
- **Pollination** for yield and quality in many crops.
- **Biological control** via natural enemies.
- **Soil functioning:** microbes and fauna drive structure and nutrient cycling.
- **Genetic diversity** enabling breeding and adaptation.
- **Ecosystem services:** water filtration, carbon storage, microclimate regulation.