

# Bioenergy crops

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**In news**— A new study has found that converting annual crops to perennial bioenergy crops can induce a cooling effect on the areas where they are cultivated.

## **Key highlights of the study-**

- Cultivation area under bioenergy crops occupies 3.8 percent  $\pm$  0.5 per cent of the global total land area, but they exert strong regional biophysical effects, leading to a global net change in air temperature of  $-0.08 \sim +0.05$  degrees Celsius.
- Researchers found that global air temperature decreases by  $0.03 \sim 0.08$  °C, with strong regional contrasts and inter-annual variability, after 50 years of large-scale bioenergy crop cultivation.
- **Compared to the herbaceous crops, changes in the energy fluxes induced by woody crops in the cultivation regions are larger**, and the cooling effect is stronger and healthier across different cultivation maps.
- **Eucalyptus, poplar, willow, miscanthus and switchgrass were the bioenergy crops used in the study.**
- The study warned that **temperature changes in the bioenergy crop scenarios may have very large spatial variations and important climate teleconnections** to other areas of the globe.
- **Warming effects in Alaska and northwestern Canada may cause greenhouse gas release from thawing permafrost**, from the four idealised bioenergy crop scenarios based on the composited cultivation map.
- Strong cooling effects in Eurasia, between 60°N and 80°N, may protect permafrost from thawing or reduce methane emissions from wetlands.
- **The study also demonstrated the importance of the crop type choice, the original land use type** upon which bioenergy crops are expanded, the total cultivation area

and its spatial distribution patterns.

- Cultivating eucalyptus generally shows cooling effects that are more robust than if switchgrass is used as the main bioenergy crop.

### About Bioenergy crops-

- Bioenergy crops are defined as any plant material used to produce bioenergy.
- They are grown and maintained at lower costs for biofuel production.
- These crops have the capacity to produce a large volume of biomass, high energy potential, and can be grown in marginal soils.
- They can positively impact the environment to reduce the level of carbon dioxide, emission of greenhouse gases and soil erosion.
- The bioenergy crops are **classified into five types namely**, first-, second- and third-generation bioenergy crops, dedicated energy crops and halophytes.
- The first-generation bioenergy crops include corn, sorghum, rapeseed and sugarcane, whereas the second-generation bioenergy crops are switchgrass, miscanthus, alfalfa, reed canary grass, Napier grass and other plants.
- The third-generation bioenergy crops contain boreal plants, crassulacean acid metabolism (CAM) plants, eucalyptus and microalgae.