Constraints and challenges to adoption and promotion of Conservation Agriculture and CA mechanization:

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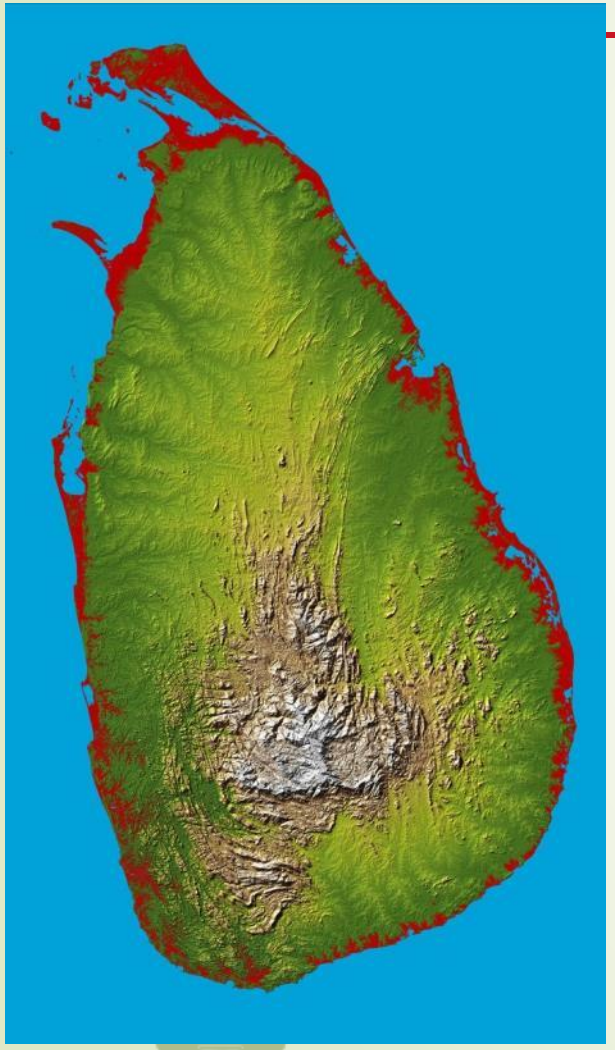
The Democratic Socialist Republic of Sri Lanka

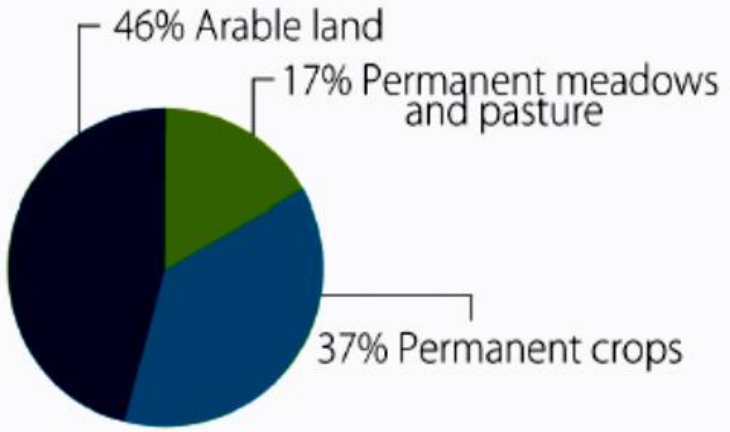


- Location - 7°N 81°E
- Total land area : 65,610 Km2
- Population – 20.48 million (2013)
- Population Density : 325 per sq.km
- Annual Rainfall : Average 900 mm, wet zone : 5000 mm
- **Per capita consumption** of **rice** is 105 kg/year

Land use

Land Use [5]

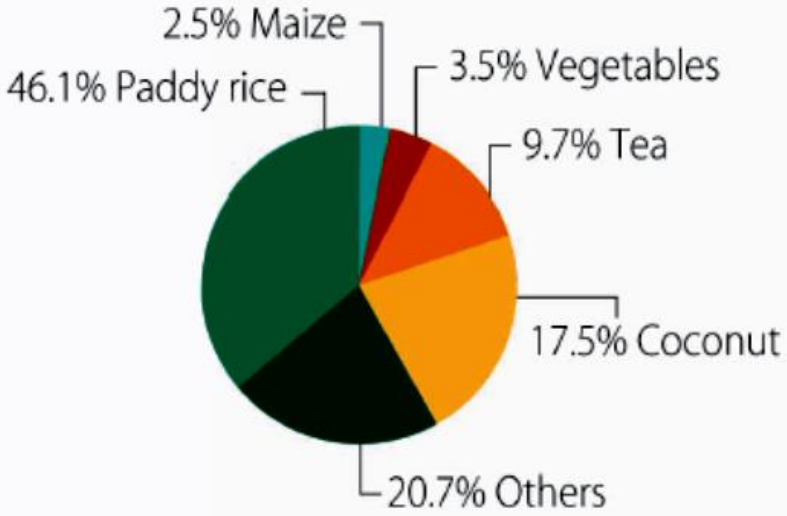
% of total land



Agricultural area is **41.8%** of total land area [5]

Main Crops [5]

% of total harvested area



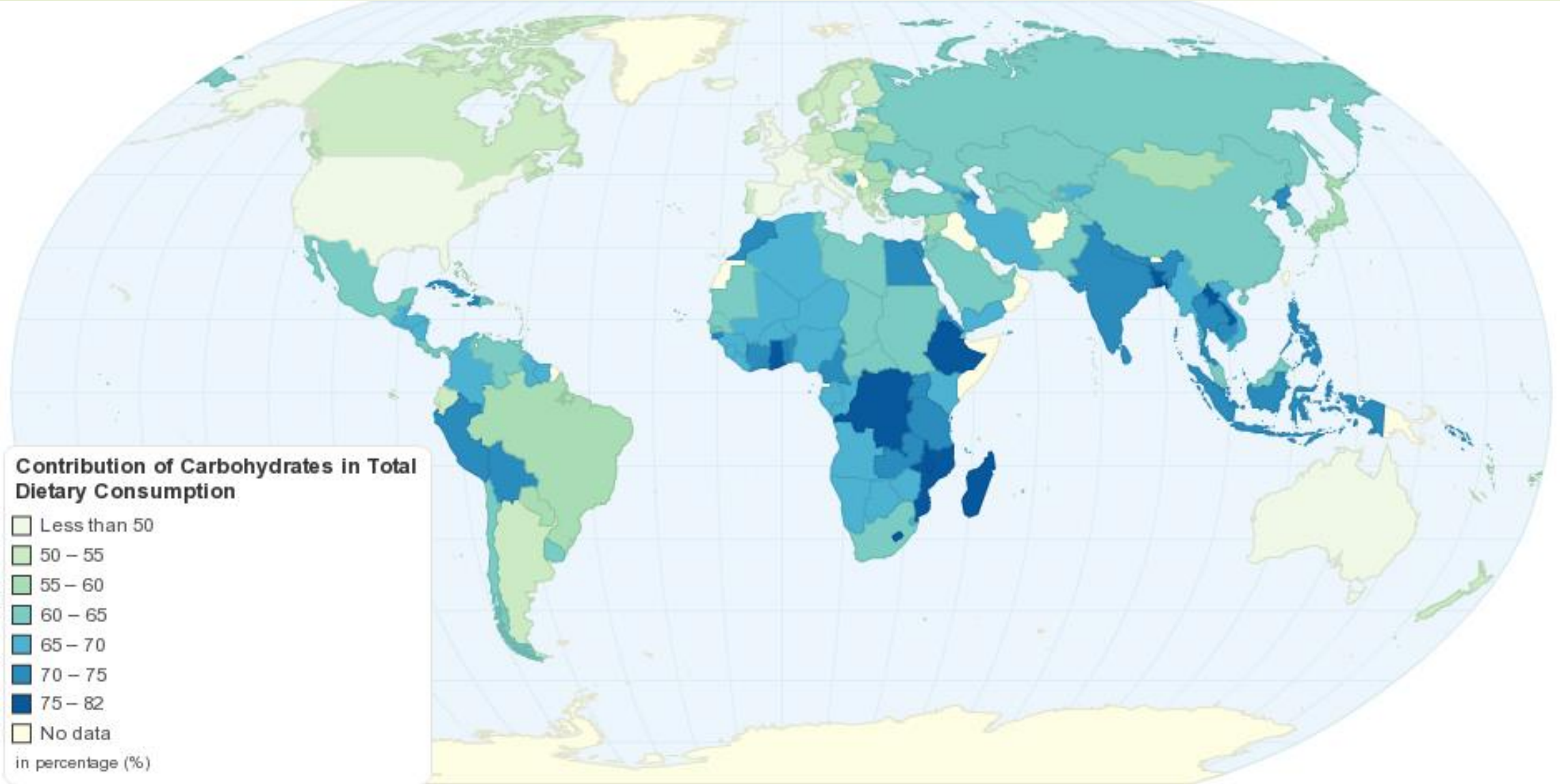
Land use

- Agricultural land - approx. 2.6 million hectares (42%)
- No. of smallholder farmers - 1.65 million
- Average landholdings - less than 2 hectares
- Smallholder farmers are in charge of almost 80% of Sri Lanka's total annual crop production

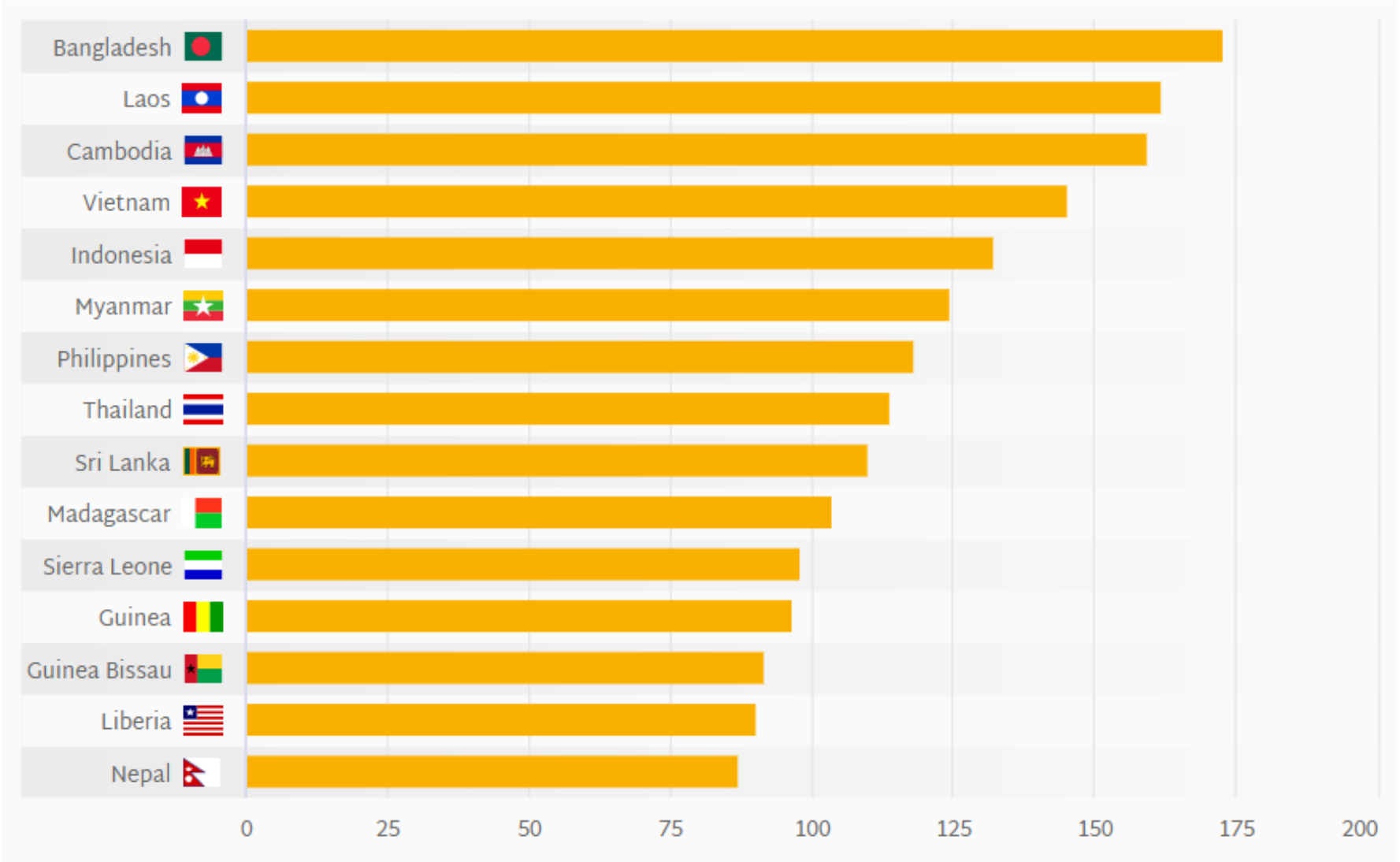
Land use

- The agricultural area in Sri Lanka has increased gradually in the past decade.
- With the end of internal conflict, previously inaccessible territories have been converted into productive cropland.
- From 2003 to 2013;
  - rice-harvested areas increased by 30.4% (911,440 to 1,188,230 hectares)
  - maize-harvested areas more than doubled (27,060 to 67,720 hectares

Contribution of Carbohydrates in Total Dietary Consumption



Rice Consumption Per Capita by Country



Basic Principles of CA

- Minimum soil disturbance
- Permanent organic soil cover with living or dead plant material
- Rotating different types of crops

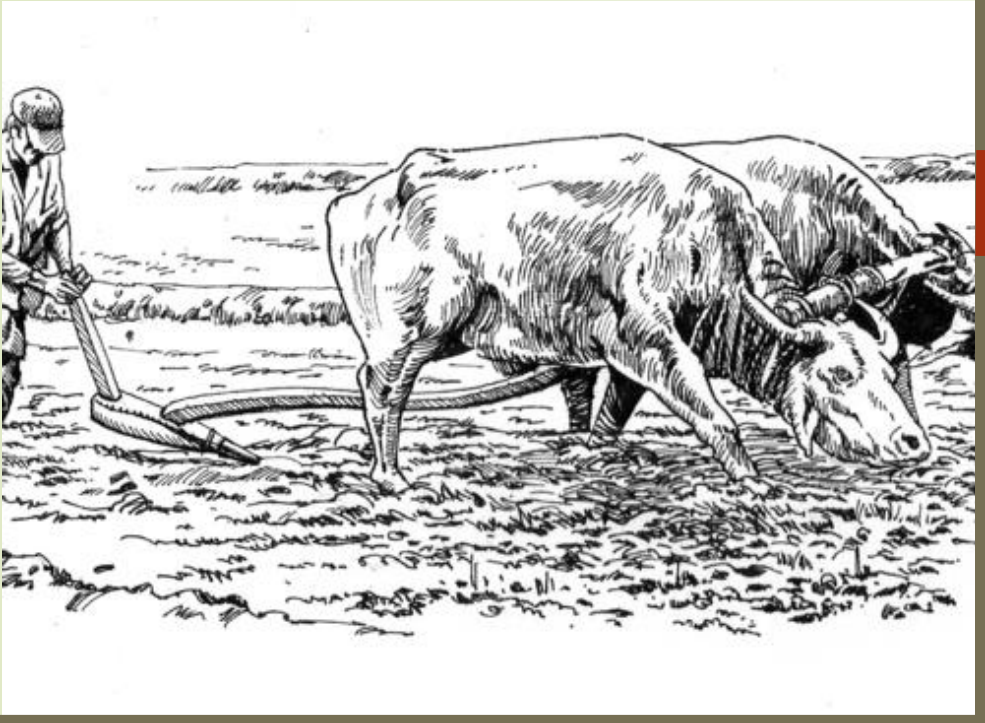
Key features of conservation agriculture systems

- No ploughing, disking or soil cultivation (i.e., no turning over of the soil);·
- Crop and cover crop residues stay on the surface; ·
- No burning of crop residues;
- Permanent crop and weed residue mulch protects the soil; ·
- The closed-nutrient recycling of the forest is replicated;·
- Lime and sometimes fertilizers are surface-applied;·
- Specialized equipment;·
- Continuous cropland use;
- Crop rotations and cover crops are used to maximize biological controls (i.e., more plant and crop diversity).

Common practices	Consequences
Removal or burning of crop residues	Loss of soil fertility and decreasing yields
Continuous ploughing and harrowing	Erosion
Overgrazing	Increased drought and flood risks
Deforestation	Food insecurity and health risks
Mono-cropping	Contamination of ground and surface water
Excessive use of fertilizers	Contamination and degradation of soils
Misuse of pesticides	Greenhouse gas release
Misuse of water	Pest invasions
	Loss of biodiversity

Main Crop: Rice

2000 - 3000 litres of water required to produced 1kg of rice



Traditional Rice Cultivation Practices in Sri Lanka

Current Practices

Ploughing Two times;

- Primary : with Disk or MB Plough
- Secondary : Rotary tiller followed by Puddling

Challenges for CA in rice cultivation system

- Need much water to control weed
  - difficult for intercropping and mulch
- Small plot sizes due to hilly terrain and land ownership
  - difficult for mechanization
- Cultivates 2 seasons per year, rice followed by rice
- No suitable machinery
- Upland rice is often effected by diseases
- Lack of research

OFC: Sri Lanka's Traditional ***"Chena"*** Cultivation; Evidence of CA from history

Machinery Available for CA in Sri Lanka

Rice

Laser leveler for Land Leveling

Dry Sowing

Minimizes water use and conserves soil moisture, when combined with minimum or zero tillage.

Transplanters : Wet planting

Rice Straw Burning

- Burn because field need to prepare for upcoming season. No time to degrade
- No straw collectors
- Cannot practice rice broadcasting while straw stay in field
- To prevent diseases spreading

Machinery Available for CA in Sri Lanka

OFC

Jap Seeders

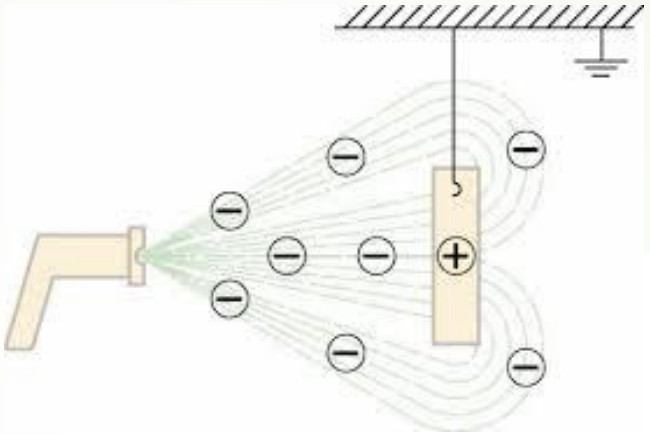
Injector Planter - Manual

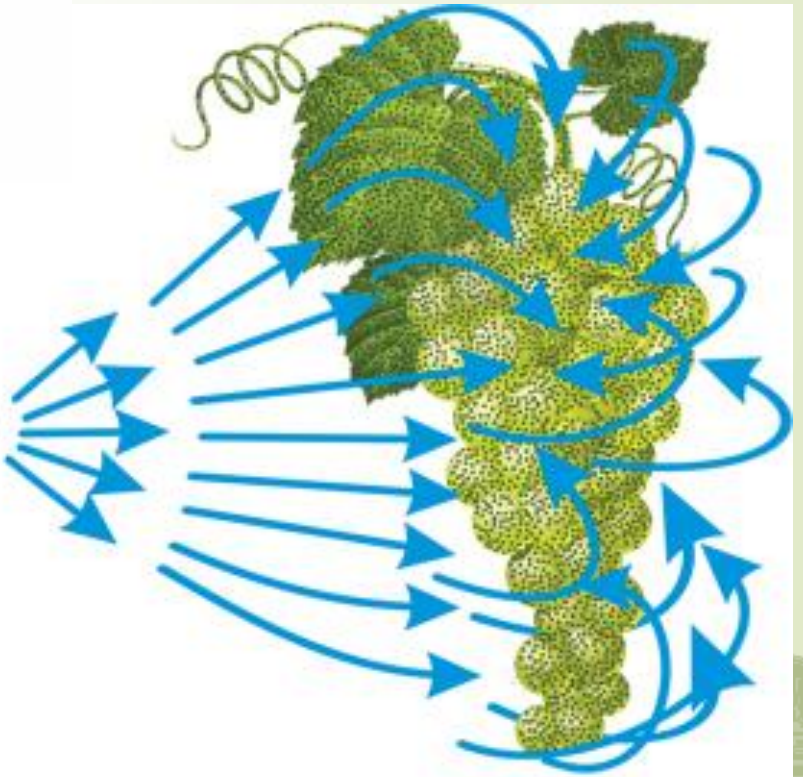
Zero Tillage : Injector Planter
- For maize only

Injector Planter – 2W Tractor

Strip Tillage : Tine tiller coupled seeder - For all OFC

Electro static sprayer





Upcountry Cultivations

Upcountry Cultivations

Upcountry Cultivations

- Vegetable Cultivation is mainly done in hill country
- Heavy soil erosion due to rain
- Heavy tillage
- Crop rotation is possible

Issues and Challenges in implementing CA

- Over decades Officers and farmers are taught the importance of tillage
  - R & D, extension were conducted focusing tiilage
  - Difficult to change the attitudes.
- Difficulty of implementing CA practices in Rice cultivation
- Ban on Glyphosate from 2015
- Minimum government attention on CA mechanization practices
- Lack of knowledge (policy makers, officers, farmers)
- Lack of resources (resource personnel, machinery, capital)
- Resistance to change

Conclusion

- As a small tropical island, rice being the staple food, it is huge challenge to practice CA, especially in rice cultivation.
- Findings/experience of reginal countries should be studied and adopted if suitable
- Investment towards CA should be immediately increased

Dr. Ray Wijewardene

Engineer, Aviator, Inventor and Olympian athlete
Inventor of Landmaster Two Wheel Tracor (1955)

"We have to question whether we practice correct type of agriculture. Many forms of 'bare-soil' agriculture, as practiced in countries with a temperate vegetation and climate, have been blindly adopted in the tropics…Sri Lanka's agricultural authorities have been 'brainwashed' totally by the 'open field' concepts of temperate farming."


Thank you