Green Manure/Cover Crops: Soil Recuperation at Zero Cost


The following photos were all taken in the fields or homes of practicing farmers in Mexico, Guatemala, Honduras, Costa Rica, Haiti, Ecuador, Peru, Paraguay, Benin, Cameroon, Japan, Thailand and Indonesia

The impact of organic matter (om):

Typical field before preparation

Same field, being prepared

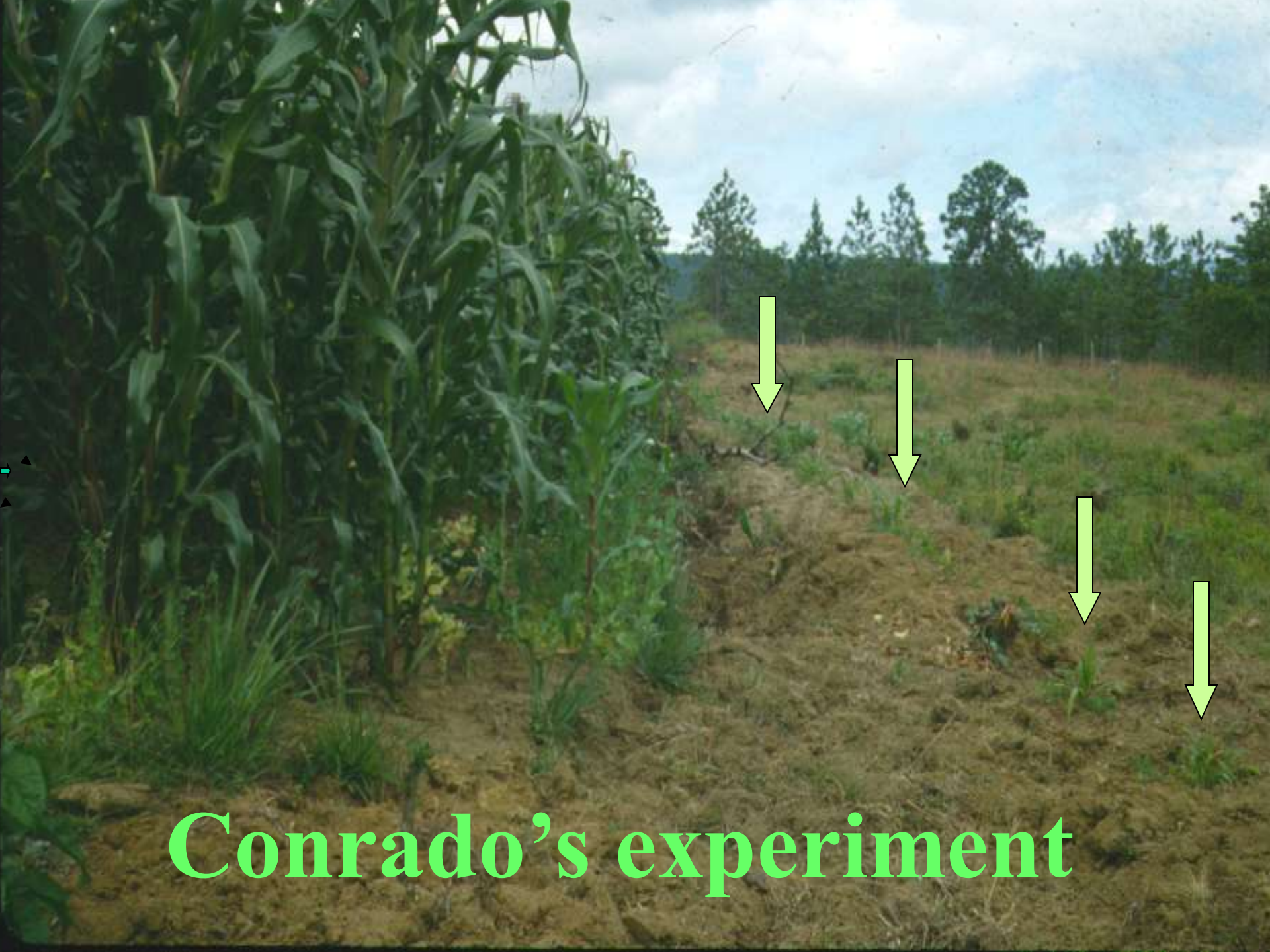

Same field, six months later

Another field, in Guatemala

And near Guinope, Honduras


The top half with mucuna

Same field, a closer look


Conrado's experiment

The First Alternative: Purchased inputs

A Second Alternative: Compost

A Third Alternative: Animal Manure

Other Alterna-tives: Coffee Pulp,

Sugarcane Bagasse

For most small farmers, green manure (gm) and cover crops (cc's) will be the least expensive way to increase significantly the om content of their soil.

Definition of a green manure/cover crop:

A plant, often leguminous but not always, whether a tree, bush, climber or creeper, that is used by a farmer to, among other things, maintain or improve soil fertility or control weeds.

NOTE:

We are not talking here about traditional green manures. Gm/cc's are not usually grown as monocrops, are almost never cut down at the flowering stage, and are seldom incorporated into the soil.

What are the characteristics we are looking for in a gm/cc?

1. Vigorous growth. Usually a good gm/cc will produce 50 t/ha or more of biomass per season.

Hundreds of thousands of farmers in South America use gm/cc's primarily to be able to use zero tillage.

2. Good weed control


Weed control is also achieved by
the mulch formed by the gm/cc.


Weed control among perennials can also be important.

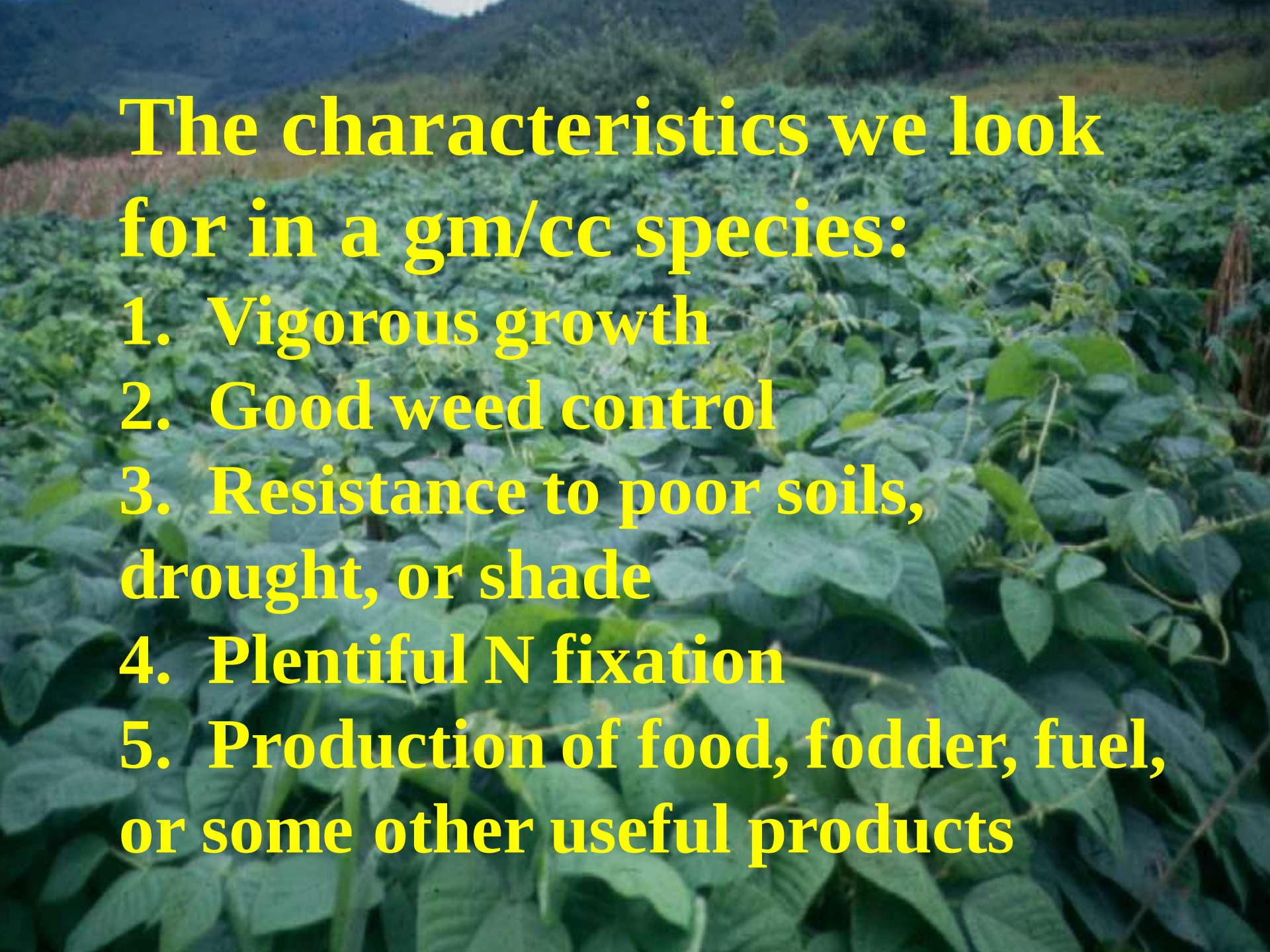
Some gm/cc's can even control weeds as noxious as Imperata grass

3. Often we want gm/cc's to grow well in the poorest of soils.

4. Usually, we also want healthy nitrogen fixation.


Most important, farmers want
their gm/cc's to produce food.

When gm/cc's produce food or fodder, the om they produce is usually a free by-product

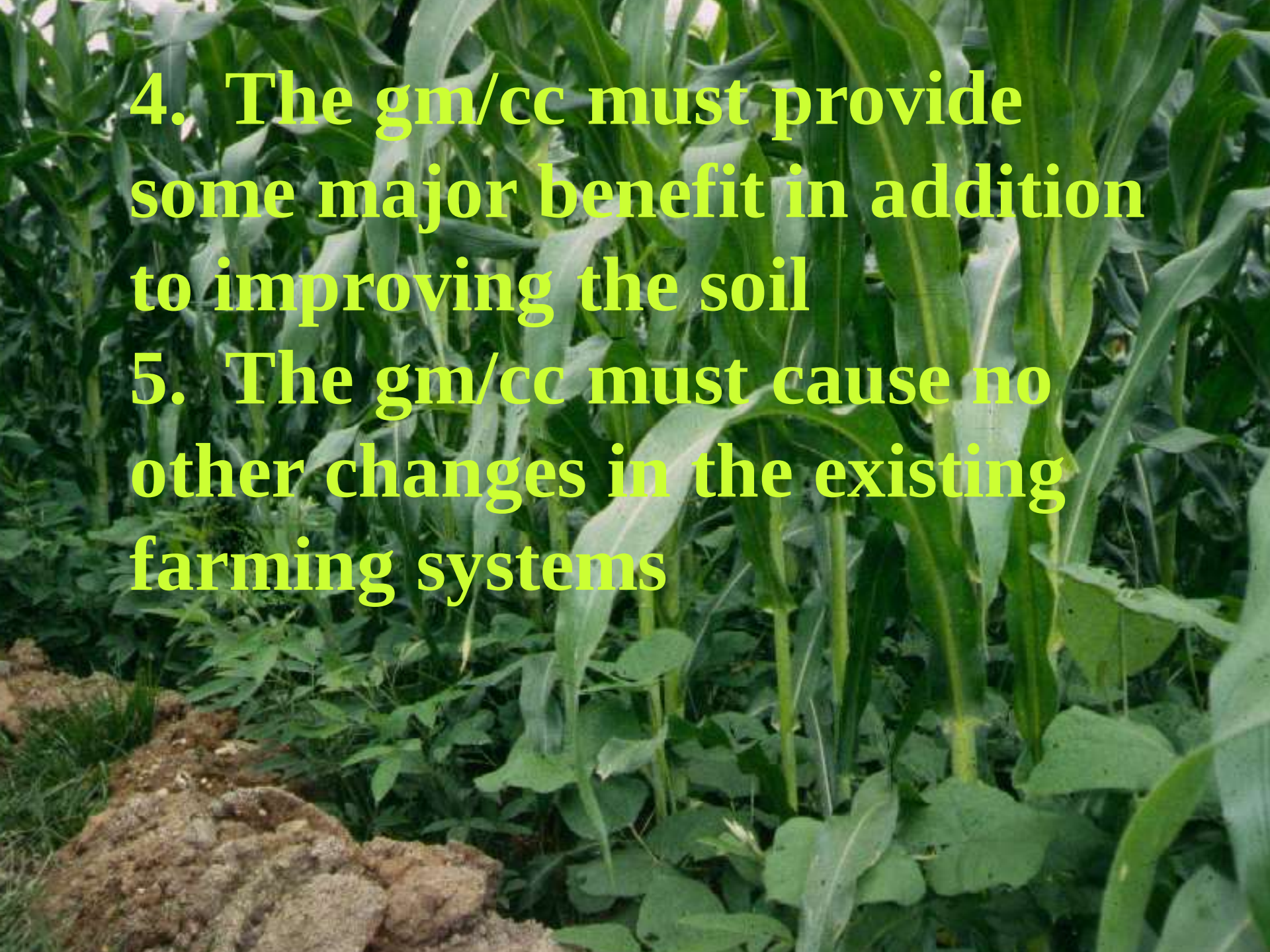


The characteristics we look for in a gm/cc species:

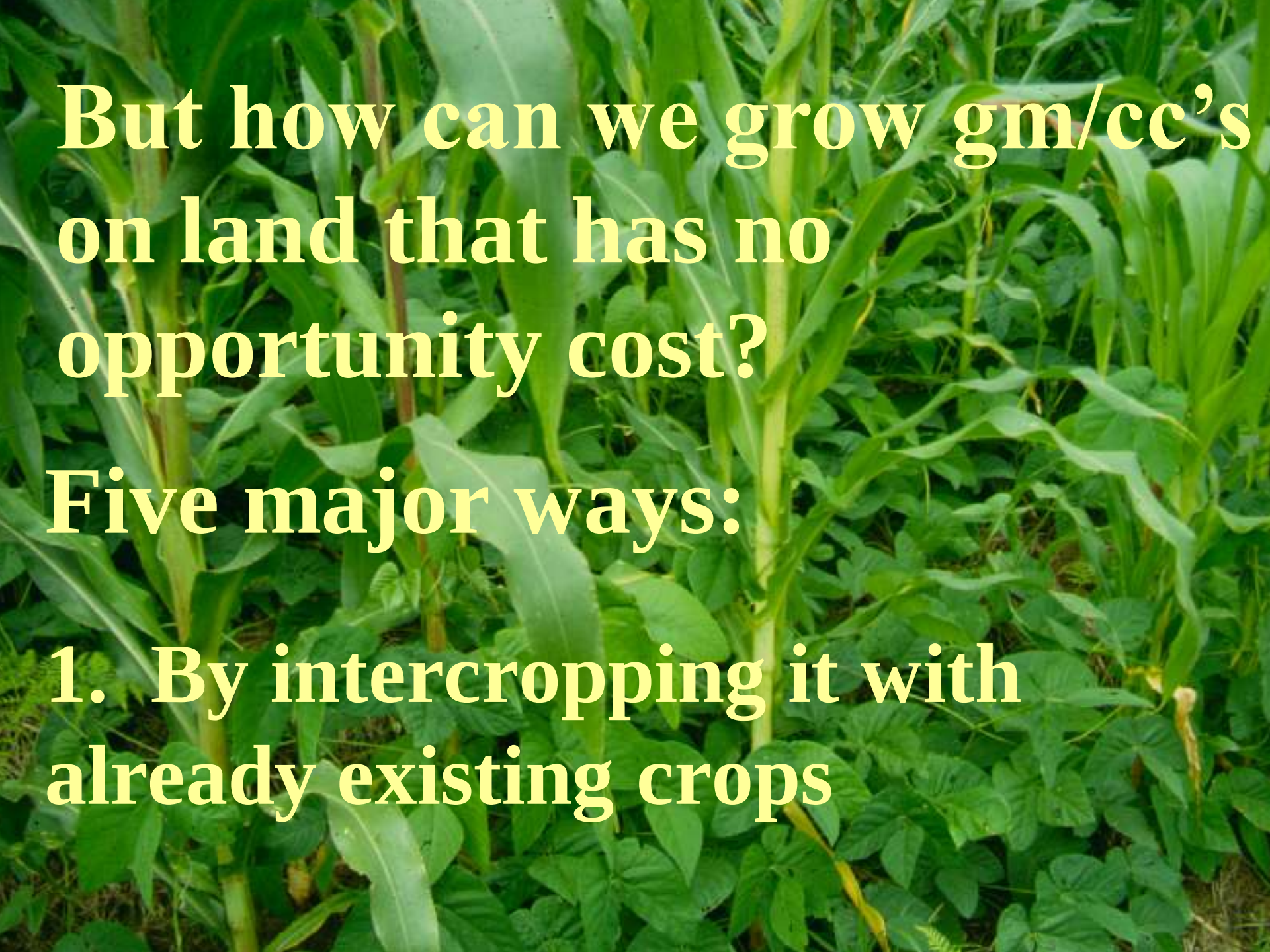
1. **Vigorous growth**
2. **Good weed control**
3. **Resistance to poor soils, drought, or shade**
4. **Plentiful N fixation**
5. **Production of food, fodder, fuel, or some other useful products**

Characteristics of sustainable gm/cc systems:

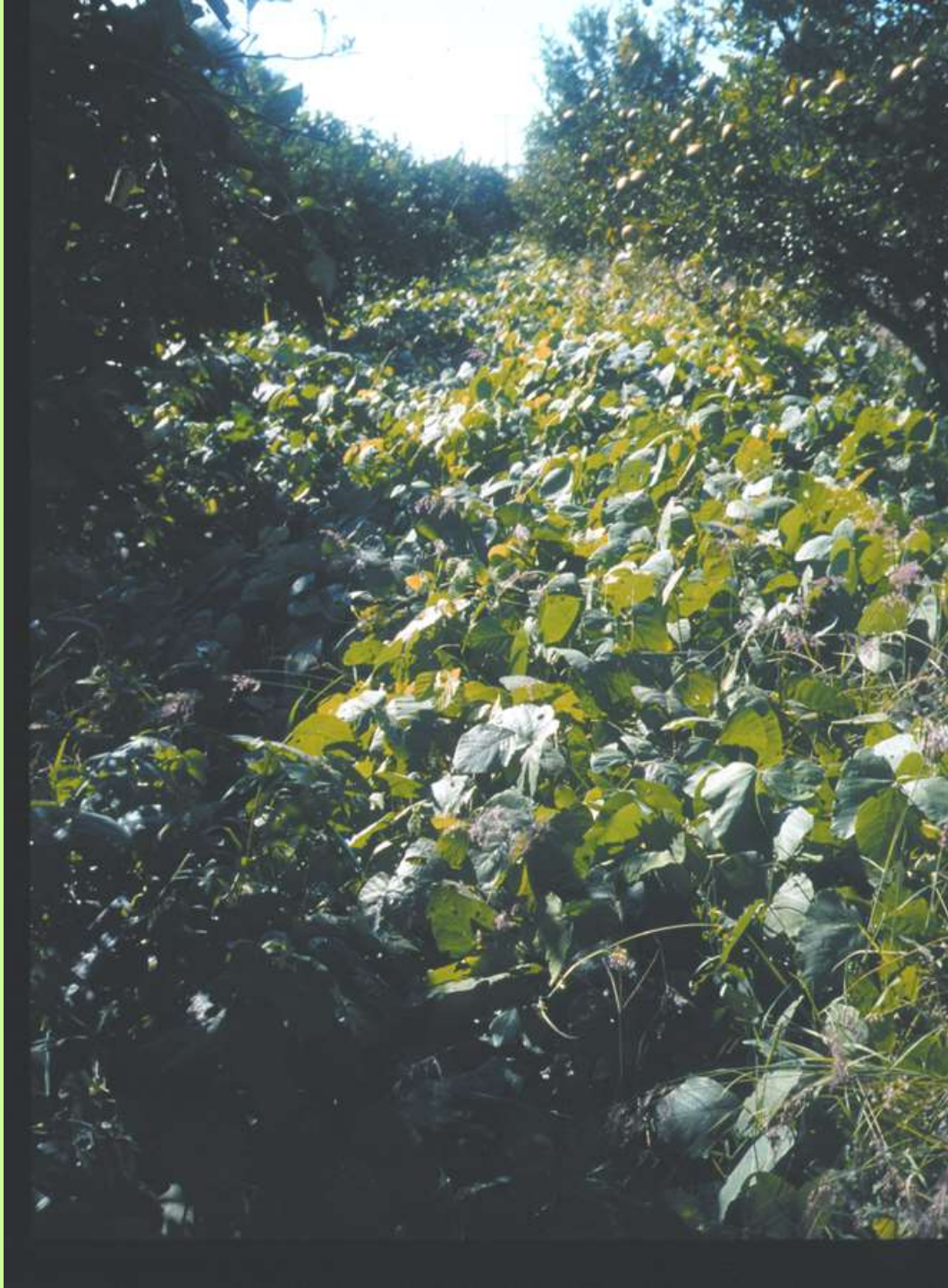
1. The land occupied by a non-food-producing gm/cc must have no opportunity cost.
2. The gm/cc must bring no cash costs.
3. The gm/cc must not increase labor costs appreciably.



4. The gm/cc must provide some major benefit in addition to improving the soil
5. The gm/cc must cause no other changes in the existing farming systems


But how can we grow gm/cc's on land that has no opportunity cost?
Five major ways:
1. By intercropping it with already existing crops

2. By growing them between and under tree crops



3. By growing them in the dry season


4. By growing them on wastelands

5. By growing them as an improved fallow

The velvetbean (Mucuna spp.) is probably the most popular gm/cc species around the world.


Difficult to use as a food, the velvetbean owes its popularity to its remarkable ability to control weeds.

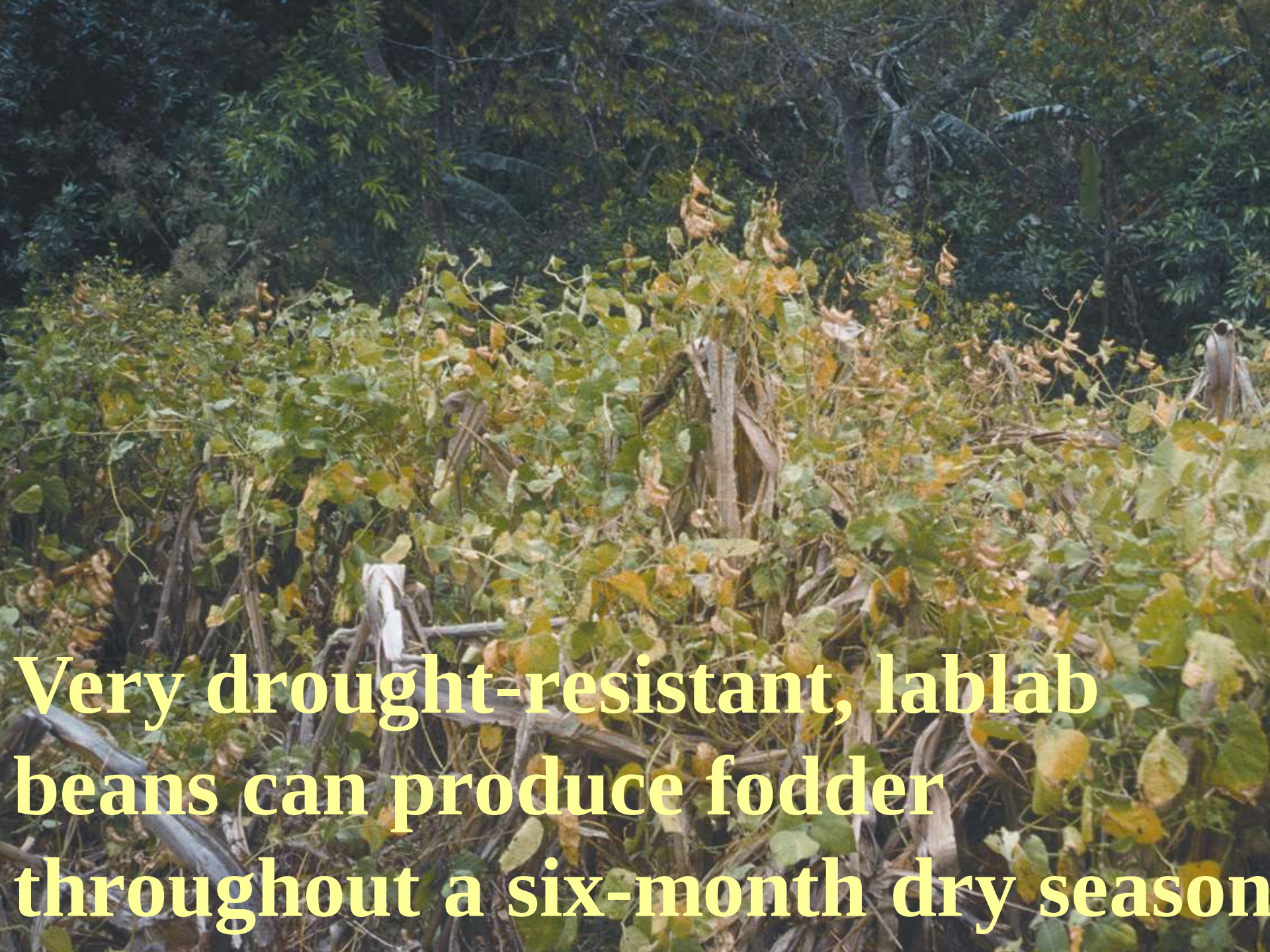
Soil from a humid tropical hillside after growing maize and velvetbeans every year for 40 years

The jackbean (Canavalia ensiformis) will grow on the worst soils, making it ideal for wasteland recuperation.


The jackbean is also highly resistant to drought.

It can also be intercropped with maize, sorghum and cassava.

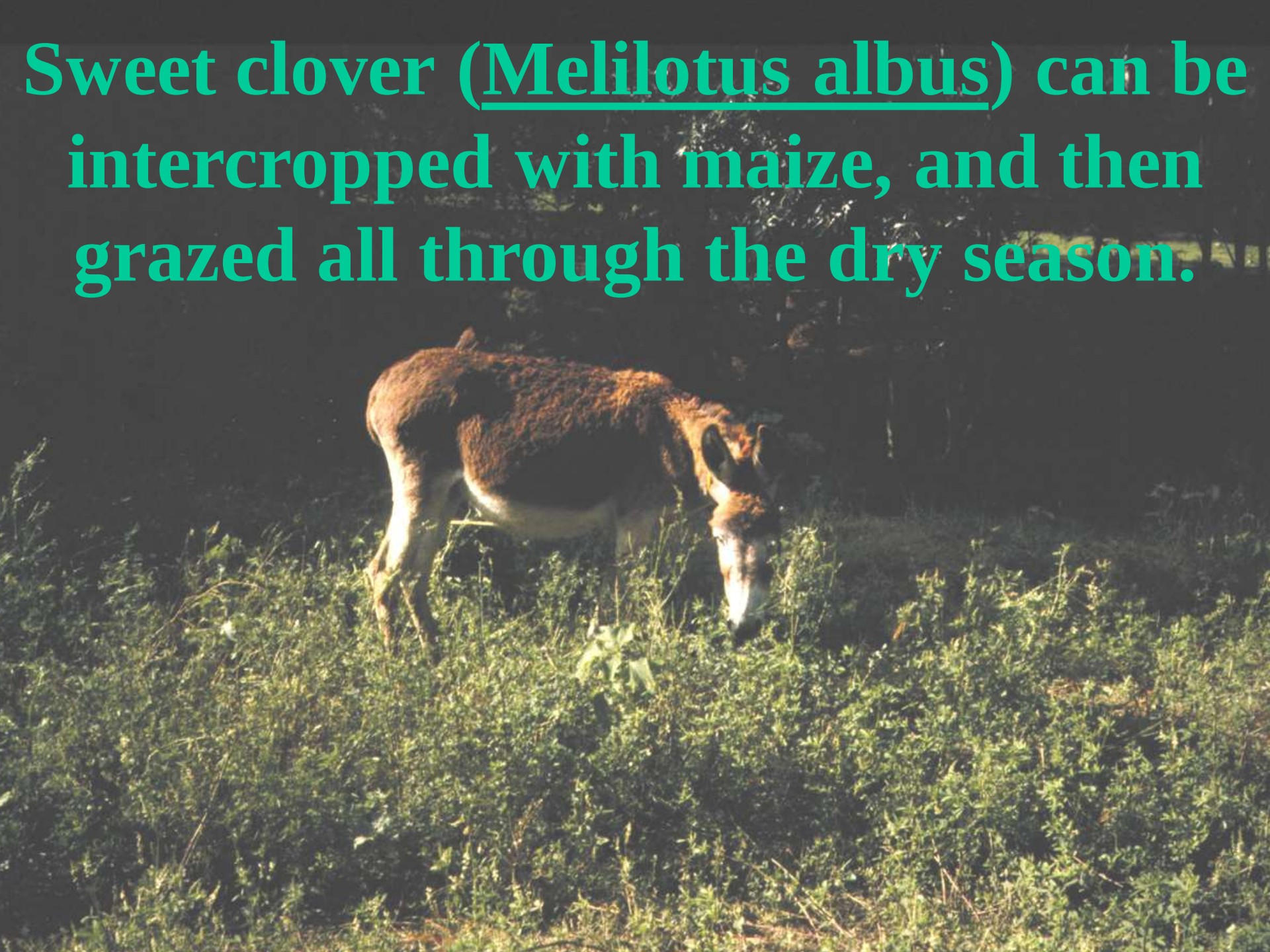
Lablab beans (Dolichos lablab) are eaten like peas or as a dry bean.

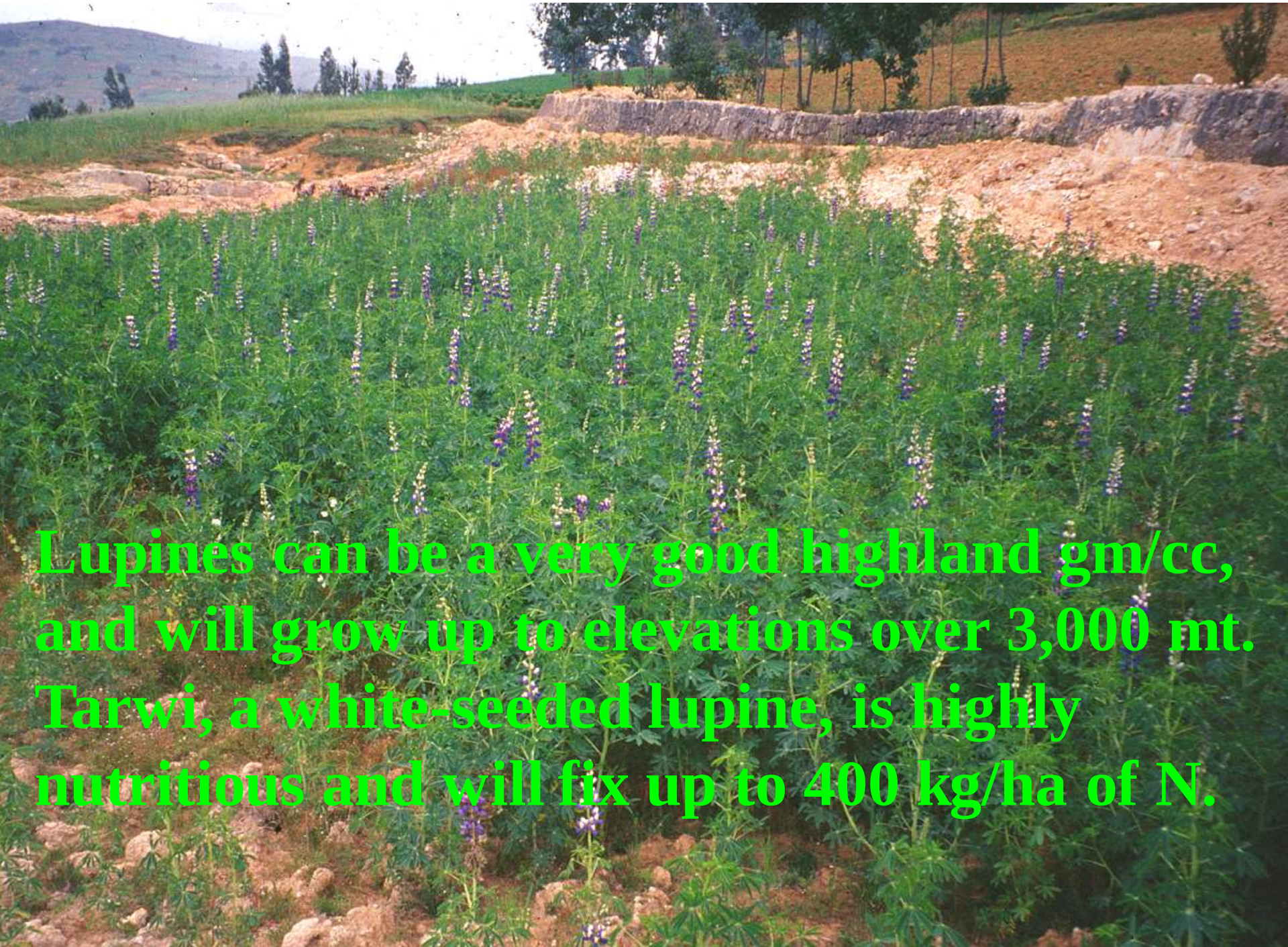

Very drought-resistant, lablab
beans can produce fodder
throughout a six-month dry season

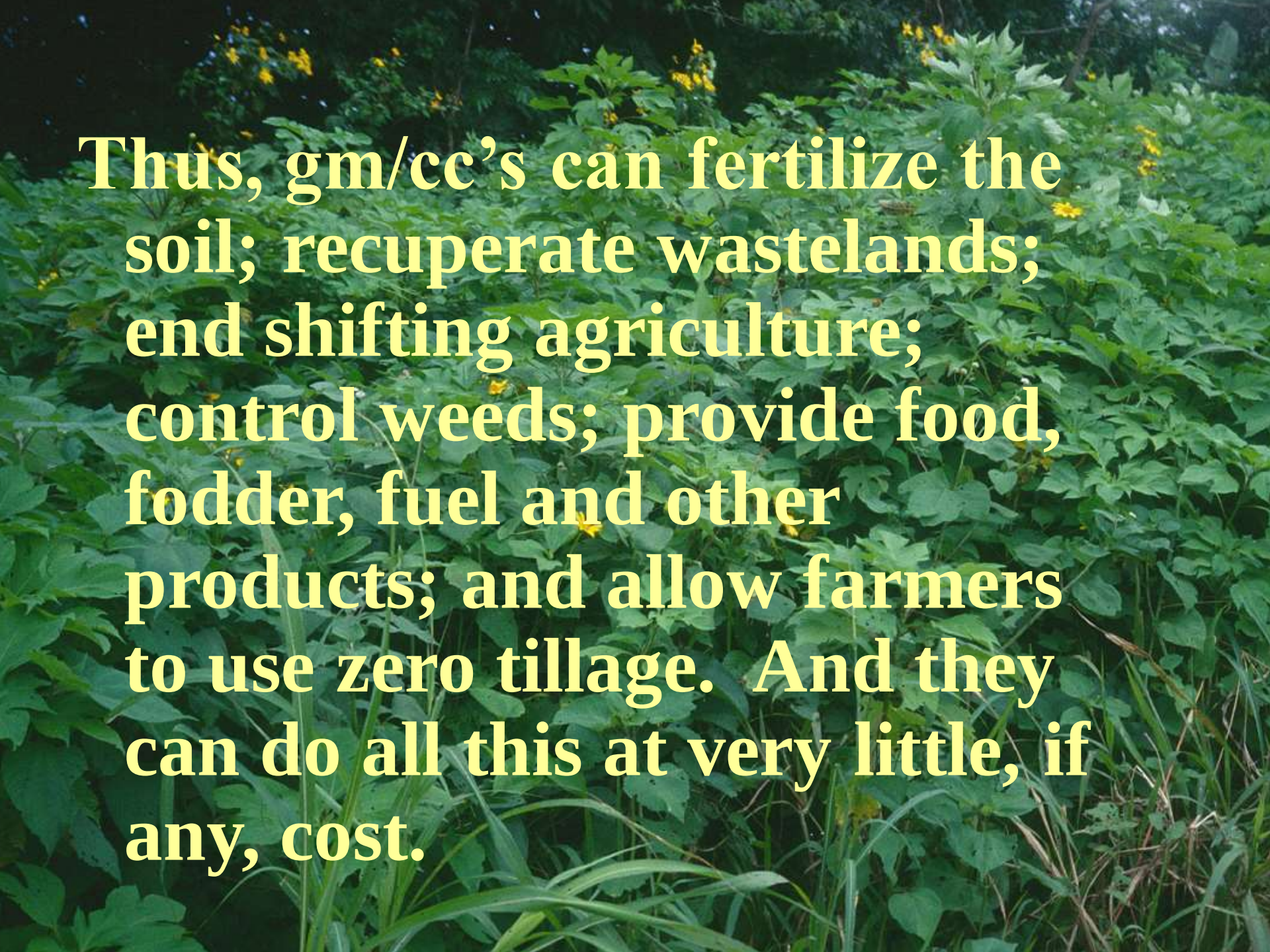
Tefrosia (Tephrosia candida or T. vogelii) is popular as a hedgerow species and as an improved fallow.


Cowpeas
(Vigna unguiculata)
are a food crop, but they also improve the soil.

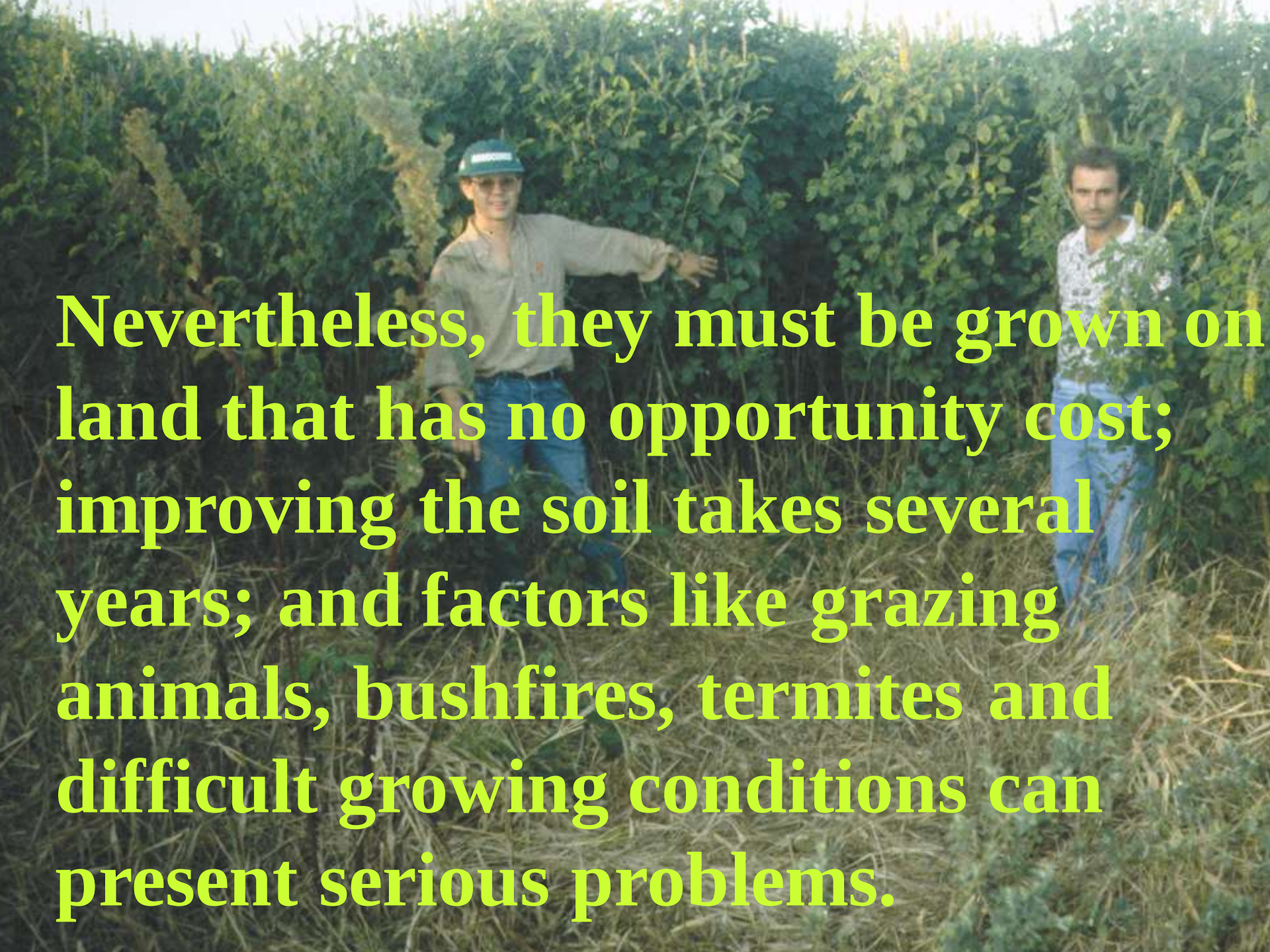

The runner bean (Phaseolus coccineus) is the most popular upland species.


Sweet clover (Melilotus albus) can be intercropped with maize, and then grazed all through the dry season.


Lupines can be a very good highland gm/cc,
and will grow up to elevations over 3,000 mt.
Tarwi, a white-seeded lupine, is highly
nutritious and will fix up to 400 kg/ha of N.



Thus, gm/cc's can fertilize the soil; recuperate wastelands; end shifting agriculture; control weeds; provide food, fodder, fuel and other products; and allow farmers to use zero tillage. And they can do all this at very little, if any, cost.


Nevertheless, they must be grown on land that has no opportunity cost; improving the soil takes several years; and factors like grazing animals, bushfires, termites and difficult growing conditions can present serious problems.


Thus, gm/cc's require of us a good deal of knowledge and creativity to find the systems that will provide the most benefits for any given group of farmers.