

respiration from lungs, etc. In the air over each acre of land in the world are eight tons of this gas—the supply therefore is inexhaustible. *Leaves* of plants inhale it directly from the air and under the influence of sun-light build it up into starch, sugar, etc.

Hydrogen and Oxygen from rain. These gases constitute water which is only supplied by rain or melted snow. Water is absorbed by *roots* of plants.

Nitrogen from air first, later from the soil. This gas comprises $\frac{1}{4}$ of the air and over each acre of the world's surface there are 35,000 tons of this gas. Certain soil bacteria, inhabiting the roots of clover, alfalfa, peas, etc., obtain it from the air and in this way nitrogen becomes fixed in the soil. In this form it is taken up by *roots* of plants.

Mineral matter (ash of plants) from soil.

To sum up—

	Source.	Nature.	Taken in by.	Required for.
Carbon.. . . .	air	solid	leaves	Protein, Fat. & Carbohydrates.
Hydrogen.. . . .	water	gas	roots	" " "
Oxygen.. . . .	"	"	"	" " "
Nitrogen.. . . .	air first, then soil	"	"	Protein.

THE IMPORTANCE OF NITROGEN.

We see from the above that *nitrogen* is absolutely necessary for the formation of protein; one of the principal parts of food. No plant can fully develop without nitrogen. It exists in the air as a *gas*, but before being absorbed by plants it *must* be fixed in the soil. No plant can breathe it in through the leaves as it does carbon dioxide. However, the legumes (clover, alfalfa, etc.,) seem to offer breeding places on their roots for special bacteria which are able to take the nitrogen from the air and supply it to the roots of their host. By the decay of the roots the soil is enriched in nitrogen. The logic may thus be set forth.

A man's body contains 26 pounds of protein, and a man must eat protein.

Protein exists in plants and animals: Animals eat plants.

Therefore, a plant must make protein.

But every 100 pounds of protein contain 16 pounds of nitrogen.

Therefore a plant must eat nitrogen.

But all plants take in nitrogen through the roots only.

Therefore, nitrogen must be fixed in the soil.

But nitrogen is a gas in the air and no plants can take it from the air directly.

But certain soil bacteria absorb this gas into their bodies and the roots of legumes offer places for them to live.

THEREFORE:—

GROW LEGUMES	to take the nitrogen from the air	
	to enrich the soil.	
	to feed other crops	
	to make vegetable protein	
	to sell as food for man	
	to feed the animals	
	to make animal protein	
	to sell as food for man.	
	OR	

The Israelites could not make bricks without straw;

The farmer cannot make protein without nitrogen.