TITLE: Fertilizerometer

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Fertilizer

A **fertilizer** is any material of natural or synthetic origin (other than liming materials) that is applied to soils or to plant tissues to supply one or more plant nutrients essential to the growth of plants. Many sources of fertilizer exist, both natural and industrially produced.

Mechanism

Fertilizers enhance the growth of plants. This goal is met in two ways, the traditional one being additives that provide nutrients. The second mode by which some fertilizers act is to enhance the effectiveness of the soil by modifying its water retention and aeration. This article, like many on fertilizers, emphasises the nutritional aspect. Fertilizers typically provide, in varying proportions:

- three main macronutrients:
  - Nitrogen (N): leaf growth
  - Phosphorus (P): Development of roots, flowers, seeds, fruit;
  - Potassium (K): Strong stem growth, movement of water in plants, promotion of flowering and fruiting.
- three secondary macronutrients: calcium (Ca), magnesium (Mg), and sulfur (S);
- micronutrients: copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), zinc (Zn), boron (B). Of occasional significance are silicon (Si), cobalt (Co), and vanadium (V).

The nutrients required for healthy plant life are classified according to the elements, but the elements are not used as fertilizers. Instead compounds containing these elements are the basis of fertilizers. The macro-nutrients are consumed in larger quantities and are present in plant tissue in quantities from 0.15% to 6.0% on a dry matter (DM) (0% moisture) basis. Plants are made up of four main elements: hydrogen, oxygen, carbon, and nitrogen. Carbon, hydrogen and oxygen are widely available as water and carbon lthough nitrogen makes up most of the atmosphere, it is in a form that is unavailable to plants. the most important fertilizer since nitrogen is present in proteins, DNA and other components ophyll). To be nutritious to plants, nitrogen must be made available in a "fixed" form. Only

some bacteria and their host plants (notably legumes) can fix atmospheric nitrogen (N_2) by converting it to ammonia. Phosphate is required for the production of DNA and ATP, the main energy carrier in cells, as well as certain lipids.

Micronutrients are consumed in smaller quantities and are present in plant tissue on the order of parts-per-million (ppm), ranging from 0.15 to 400 ppm DM, or less than 0.04% DM. These elements are often present at the active sites of enzymes that carry out the plant's metabolism. Because these elements enable catalysts (enzymes) their impact far exceeds their weight percentage.

Overfertilization

Careful fertilization technologies are important because excess nutrients can be detrimental. Fertilizer burn can occur when too much fertilizer is applied, resulting in damage or even death of the plant. Fertilizers vary in their tendency to burn roughly in accordance with their salt index.

Environmental Effects

Use of fertilizers are beneficial in providing nutrients to plants although they have some negative environmental effects. The large growing consumption of fertilizers can affect soil, surface water, and groundwater due to dispersion of mineral use.

Water

Phosphorus and nitrogen fertilizers when commonly used have major environmental effects. This is due to high rainfalls causing the fertilizers to be washed into waterways.

Soil

Acidification

Nitrogen-containing fertilizers can cause soil acidification when added. This may lead to decrease in nutrient availability which may be offset by liming.

Contribution to climate change

The greenhouse gases carbon dioxide, methane and nitrous oxide are produced during the manufacture of nitrogen fertilizer. The effects can be combined into an equivalent amount of carbon dioxide. The amount varies according to the efficiency of the process. The figure for the United Kingdom is over 2 kilogrammes of carbon dioxide equivalent for each kilogramme of

ammonium nitrate. Nitrogen fertilizer can be converted by soil bacteria to nitrous oxide, a greenhouse gas.

KNOWING THAT YOU ARE GIVING TOO MUCH FERTILIZER TO YOUR CROPS:

- Yellowing and wilting of lower plant leaves
- Browning of leaf margins and tips
- Crust of fertilizer on soil surface
- Black brown or rotting roots
- Slow to no growth
- Leaf drop

PROPOSED SOLUTION

The distribution of fertilizers can be made according to the crop which needs to be fertilized. A certain crop needs a certain amount of fertilizer. Any less than that and the crop will decrease in size and won't provide the required nutrients as much. Any more than that and the crop will not be able to take up water. Plants rely on an osmotic pressure gradient in order to collect water. When the concentration of dissolved solids rises continuously from the soil around the roots to the core of the root, this causes water to flow into the plant. When the pressure around the roots gets too high, the flow of water reverses. This is where the term burning your plants comes from. The water flows from the leaves out the roots the leaves burn because they don't have water to cool them.

This is the reason that the distribution of fertilizers has to be made according to the crop which needs to be fertilized. We can create a machine which drops a certain fixed amount of fertilizer that a respective crop needs, no amount more or less than that. The machine (which is in the form of a one-wheeled cycle) can be moved throughout the field, and every single crop can be fertilized according to its required amount.

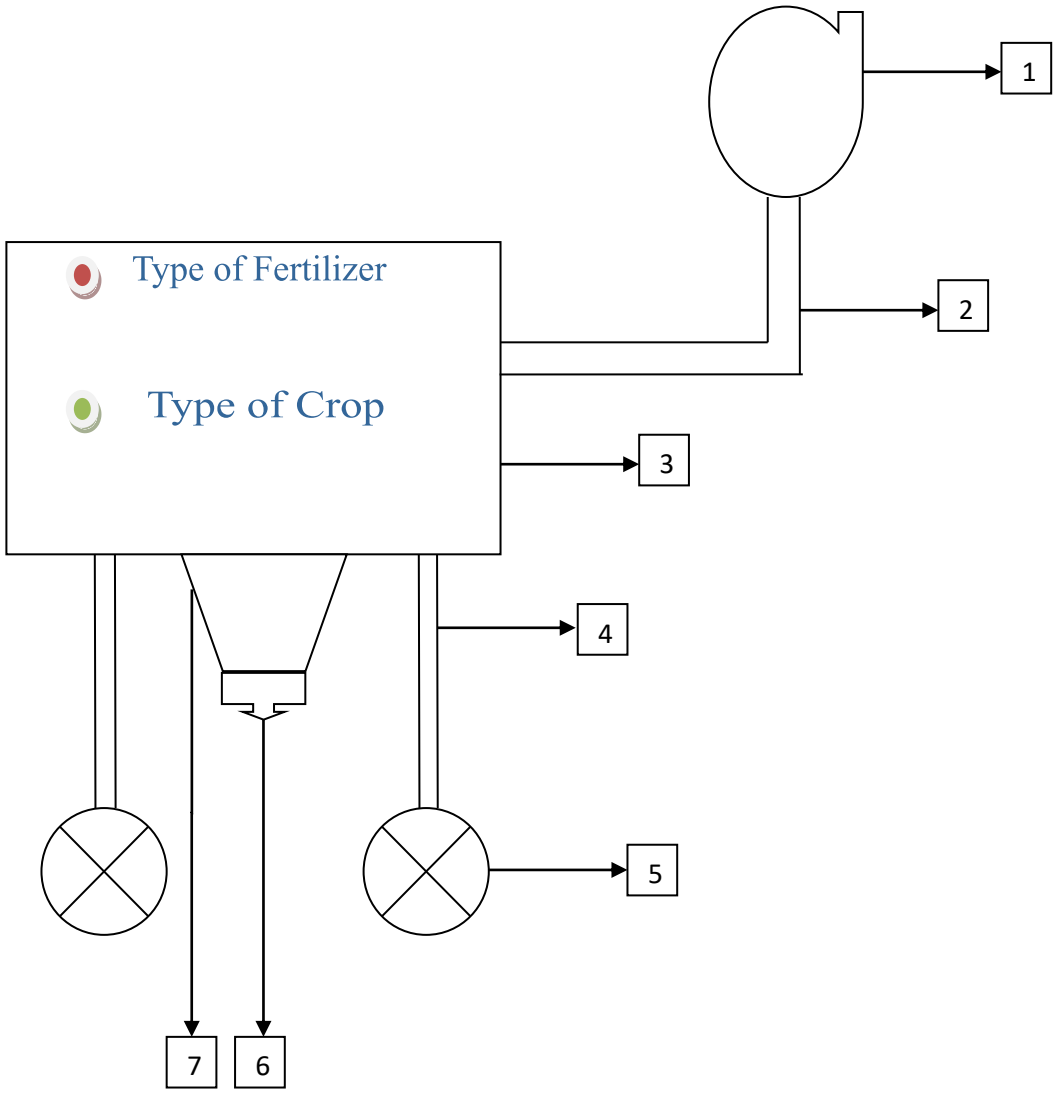

Fig 1: Fertilizometer

LABELLING:

1. Container containing the required fertilizer

2. Tube thorough which the fertilizer passes into the Selection Box

n Box where the type of fertilizer is selected: solid or liquid; as well as the type of crop is hich automatically decides the amount of fertilizer that each plant of the selected crop needs.

4. Wheel Supports

5. Wheels

6. Container where selected quantity of fertilizer is stored before it is passed on to the distributer knob

7. Distributer knob

Working:

The fertilizer will be poured into the Container. The required fertilizer will flow through the Tube wherein the fertilizer will pass into the Selection Box

In Selection Box the type of fertilizer is selected: solid or liquid; as well as the type of crop is selected, which automatically decides the amount of fertilizer that each plant of the selected crop needs.

The amount of fertilizer will flow into the Container where selected quantity of fertilizer is stored before it is passed on to the distributer knob. Finally the fertilizer will be poured through the Distributer knob

Conclusion:

The distribution of fertilizers can be made according to the crop which needs to be fertilized. Neither more nor less fertilizer will be poured onto the crop.

Drafted by:

Esha Ajit Chaugule

Dr. Archana Ajit Chaugule