

1 Fertilizers – An Introduction

1.1 Main types of fertilizers

Fertilizer is any material, organic or inorganic, natural or synthetic, which supplies one or more of the chemical elements required for the plant growth. Sixteen elements are identified as essential elements for plant growth, of which nine are required in macro quantities and seven in micro quantities. However, the primary nutrients for plant growth are **Nitrogen (N)**, **Phosphorus (P)** and **Potassium (K)**. Their concentration in a fertilizer is expressed as a percentage of N, P₂O₅ and K₂O. Primary nutrients are normally supplied through chemical fertilizers.

Fertilizers are broadly grouped into:

- **Nitrogenous (N) fertilizers** – Urea is the main nitrogenous fertilizer.
- **Phosphatic (P) fertilizers** - Di-Ammonium Phosphate (DAP), Single Super Phosphate (SSP), Mono Ammonium Phosphate (MAP) and Triple Super Phosphate (TSP) are the main fertilizers¹ of this group.
- **Potassic (K) fertilizers** – Muriate of Potash (MOP) (which provides P and K nutrients) is the main potassic fertilizer.
- **Complex and other fertilizers** – These includes different grades of complex fertilizers (termed as NPK complexes) which provide all three nutrients in varying proportions (e.g. 15-15-15; 17-17-17; 14-28-18; 12-32-16²) as well as other fertilizers like Ammonium Sulphate (AS), Nitro Phosphate etc.

1.2 Secondary and micro-nutrients

Calcium, magnesium and sulphur are termed as secondary nutrients, and are required in relatively smaller quantities than primary nutrients for plant growth. Deficiencies in supply of secondary nutrients and other essential elements reduce the efficiency of primary nutrients by restricting the yield to a lower level. Hence, to obtain optimum results, crops have to be supplied with secondary nutrients in addition to primary nutrients.

Micronutrients are a group of nutrients which are essential for plant growth in minute quantities. Intensive cropping depletes all nutrients, including micronutrients, from the soil at a fast rate. Therefore, selective use of micronutrients is necessary for increasing agricultural production. Iron, zinc, manganese, copper, boron, molybdenum and chlorine fall under this category. Ten micronutrients, namely zinc sulphate (monohydrate &

¹ DAP (Di-Ammonium Phosphate) and MAP (Mono Ammonium Phosphate) are also important sources of nitrogen (in addition to phosphate)

² These figures denote the proportion of N-P-K.

Performance Audit of Fertilizer Subsidy

heptahydrate), manganese sulphate, borax, solubor, copper sulphate, ferrous sulphate, ammonium molybdate, chelated zinc, and chelated iron have been incorporated in the Fertilizer Control Order (FCO). Further, fortified fertilizers like zincated urea and boronated single superphosphate have also been notified under the FCO.

1.3 Controlled and decontrolled fertilizers

In terms of control, fertilizers can be categorized into:

- **Controlled fertilizer (Urea)** – i.e. fertilizers subject to price, distribution and movement control under the Fertilizer Control Order (FCO) and Fertilizer Movement Control Order (FMCO) issued under the Essential Commodities Act (ECA). Urea is the only controlled fertilizer; currently only 50 per cent of the production is controlled.
- **De-controlled fertilizers** – all other fertilizers³ (DAP, NPK complexes, MAP, MOP, TSP, AS and SSP etc.)

However, in practice, fertilizers (whether controlled or decontrolled) which are subsidized for agricultural consumption are, in effect, subject to explicit/ implicit control by the Government of India (GoI) (either through formal allocation orders or through supply plans) and the State Governments, primarily to ensure proper targeting of fertilizer subsidy and minimize diversion of subsidized fertilizer for non-agricultural purposes. Also, “farm-gate” prices of all major fertilizers subject to subsidy are controlled by the Government to ensure a uniform sale price throughout the country, which is substantially lower than the cost of production/ import.

1.4 Dependence on import

Out of the three primary nutrients (N, P and K) required for various crops, indigenous raw materials are available mainly for nitrogenous fertilizers. Though the requirement of urea is largely met through indigenous production, it is also imported on Government account to bridge the gap between requirement and domestic production. In 2008-09, imported urea accounted for about 15 per cent of the total requirement. This is in contrast to the situation during 2000-01, 2002-03, and 2003-04, when domestic production was enough to meet the entire requirement and, therefore, no urea was imported on Government account.

In the case of phosphates, the paucity of domestic raw material has been a constraint in the attainment of self-sufficiency in the country. Indigenous rock phosphate supplies meet only 5-10 per cent of the total requirement of P₂O₅ (Phosphate). During 2008-09, about 65 per cent of the requirement of phosphatic fertilizer was met through domestic production, based on

- indigenous/imported rock phosphate, imported sulphur and ammonia; and

³ Di-Ammonium Phosphate(DAP), Mono-Ammonium Phosphate(MAP), Muriate of Potash(MOP), Tripple Super Phosphate(TSP), Ammonium Sulphate (AS), Single Super Phosphate (SSP)

Performance Audit of Fertilizer Subsidy

- indigenous/imported intermediates, viz ammonia and phosphoric acid;
- the remaining 35 per cent of requirement was met through import of finished fertilizers.

In case of MOP, the entire demand for direct application as well as for production of complex fertilizers is met through imports.