

Circular No.: 1022/10/2016-CX

F. No. 106/03/2013-CX.3
Government of India
Ministry of Finance
Department of Revenue
Central Board of Excise and Customs

New Delhi, dated the 6th April, 2016

To,

Principal Chief Commissioner of Central Excise/ Service Tax (All),
Chief Commissioner of Central Excise/ Service Tax (All),
Principal Commissioner of Central Excise/ Service Tax (All),
Webmaster, CBEC

Madam/Sir

Sub: Classification of Micronutrients, Multi-micronutrients, Plant Growth Regulators and Fertilizers – reg.

The issue of classification of micronutrients, multi-micronutrients, plant growth regulators and fertilizers has remained a disputed area in Central Excise. To bring clarity to the issue of classification thereof, it was decided to take opinion of Indian Agricultural Research Institute (IARI) on various issues relating to micronutrients such as - what constitutes micronutrients, its usage, distinction from plant growth regulator, if any, etc. In light of the opinion received from IARI, Central Excise Tariff and explanatory notes of HSN, nature, usage and classification of micronutrients, multi-micronutrients, plant growth regulators and fertilizers is explained in the following paragraphs.

2.1 Micronutrients are essential nutrients that are required in small quantities for the normal growth and development of plants. As on today, iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), boron (B), molybdenum (Mo), nickel (Ni) and chlorine (Cl) are included in this category. These elements are also called minor or trace elements, but this does not mean that they are less important than macronutrients. Reply received from IARI on the subject, enclosed with the circular, may please be referred for further details. Inputs received from the trade indicates that these micronutrients are sold in the market as 'micronutrient fertilizer' supplying one or more of the eight essential nutrients listed above, namely iron to chlorine. However, in the trade parlance sale of micronutrients as 'micronutrient fertilizers' would not lead to classification thereof under chapter 31 as

fertilizers for the purposes of Central Excise Tariff. For classification under chapter 31, at least one of the elements, namely- nitrogen, phosphorus or potassium should be an essential constituent of the fertilizer as per chapter note 6 of chapter 31.

2.2 There is no specific heading in the tariff for classification of micronutrients. However, where the micronutrient is a separate chemically defined compound, it will be classifiable under the heading for that chemically defined compound under chapter 28 or chapter 29. For example, some of the sulphates of micronutrients are specifically covered under CETH 2833.

2.3 Vide Notification no. 12/2016 - C.E dated 1.3.2016, Notification no. 12/2012 - C.E dated 17.3.2012 has been amended and a new serial no 109A has been inserted to exempt duty of excise in excess of 6%, payable on micronutrients classifiable under chapter 28, 29 or 38 and covered under serial number 1(f) of Schedule 1, Part (A) of the Fertilizer Control Order, 1985 and manufactured by the manufacturers registered under the Fertilizer Control Order, 1985.

3.1 Plant Growth Regulators are defined as organic compounds other than nutrients that affect the physiological processes of growth and development in plants when applied in low concentration. Plant growth regulators are active at low concentrations in promoting, inhibiting or modifying growth and development. They are either natural or synthetic compounds that are applied directly to a target plant to alter its life processes and its structure to improve quality, increase yields, or facilitate harvesting etc. These are in the nature of plant hormones and classical of them are auxins, cytokinins, gibberellins (all three promoters) and abscisic acid, ethylene (both inhibitors). PGRs in the list are not exhaustive and more growth substances are being discovered in this category. PGRs are naturally produced by plants and they act by controlling or modifying, plant growth processes such as formation of leaves and flowers, elongation of stems, development and ripening of fruits etc. Synthetic organic chemicals are also used as PGRs and are industrially produced and marketed. A list of some of the PGRs industrially produced in India is enclosed with the reply of IARI.

3.2 It would thus be noted that PGRs are different from nutrients, be it macronutrient or micronutrient. The difference between PGR and micronutrient has been clearly brought out in the reply from ICAR. PGR as a substance is specifically covered under CETH 3808. More specifically, Gibberellic acid and Plant Growth regulators are respectively covered under tariff item 3808 9330 and 3808 9340.

4. Fertilizers are classified under chapter 31 of the Central Excise Tariff and for this purpose they may inter alia be minerals or chemical fertilizers - nitrogenous (CETH 3102), phosphatic (CETH 3103), potassic (CETH 3104) or fertilizers consisting of two or three of the fertilizing elements namely nitrogen, phosphorous and potassium; other fertilizers (CETH 3105). For the purpose of classification of any product as "other fertilizers", chapter note 6 of Chapter 31 is relevant which provides that the term "other fertilizers" applies only to products of a kind used as fertilizers and contain, as an essential

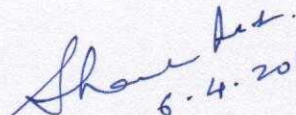
constituent, at least one of the elements nitrogen, phosphorus or potassium. It is quite clear that for any product to merit classification under CETH 3105 as other fertilizers, the product must have nitrogen or phosphorus or potassium or their combination as an essential constituent providing the essential character to the product. The chemical elements - nitrogen, phosphorus and potassium are also referred as macronutrients or primary fertilizer elements and are required in higher quantity by the plants.

4.2 Any product where the essential elements are not nitrogen or phosphorus or potassium or their mixture would not merit classification under CETH 3105. Further, the specific exclusion of separate chemically defined compounds as laid down in chapter note 1(b) and in the HSN Explanatory Notes to the heading 3105.90, reinforce the above conclusion. It may also be noted that notifications issued under Fertilizer Control Order are not relevant for deciding classification under the Central Excise Tariff.

5. **Mixtures** of micronutrients/multi-micronutrients with fertilisers are also manufactured and sold. They shall be classified according to their essential characters and general rules for interpretation of the schedule to the tariff. Where the essential constituent giving character to the mixture is one or more of the three elements namely Nitrogen, Phosphorous or Potassium, the mixture shall be classified under any of the heading of Chapter 31, depending upon its composition. On the other hand, where the essential character of the product is that of mixture of micronutrients/multi-micronutrients having predominately trace elements, it shall be classified under CETH 3824 as chemical products not elsewhere specified or included.

6. Past circulars of the Board on the subject namely 79/79/94-CX dt 21-11-94 and 392/25/98 - CX dt 19-5-1998 stand rescinded. Classification of Micronutrients, Multi-micronutrients, Plant Growth Regulators and Fertilizers shall be governed by the clarification contained in this circular to the extent the product under consideration is covered by the circular.

7. Difficulty experienced, if any, in implementing the circular should be brought to the notice of the Board. Hindi version would follow.


6-4-2016.

(Shankar Prasad Sarma)

Under Secretary to the Government of India

Encl: Opinion of IARI (5 pages)

**ICAR-Indian Agricultural Research Institute
New Delhi**

Classification of Micro-nutrients

S.No	Points	Comments
i)	<p>What are Plant Micro-nutrients? What are their functions in the plant?</p>	<p>Micronutrients are essential nutrients that are required in small quantities for the normal growth and development of plants, As on today, iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), boron (B), molybdenum (Mo), nickel (Ni) and chlorine (Cl) are included in this category. The concentration of these nutrients in plants is found often within 100 mg kg⁻¹ (on dry weight basis), except Fe and Mn, which can go normally up to about 500 mg kg⁻¹. These elements are also known as minor or trace elements, but this does not mean that they are less important than macronutrients.</p> <p>Functions</p> <p>Iron</p> <ul style="list-style-type: none"> • Iron is a constituent of two groups of proteins, viz. (a) Heme proteins containing Fe porphyrin complex as a prosthetic group: Cytochrome oxidase, catalase, peroxidase, leghemoglobin, and (b) Fe-S proteins in which Fe is coordinated to the thiol group of cysteine or to inorganic S: Ferredoxin • It activates a number of enzymes, including aminolevulinic acid synthetase and coproporphyrinogen oxidase. • It plays an essential role in the nucleic acid metabolism. • It is necessary for synthesis and maintenance of chlorophyll in plants. <p>Manganese</p> <ul style="list-style-type: none"> • Manganese is an integral component of the water-splitting enzyme associated with photosystem II. Because of this role, Mn-deficiency is associated with adverse effects on photosynthesis and O₂ evolution. • It is a constituent of superoxide dismutase (Mn-SOD). Role of Mn assumes criticality because Mn-SOD (present in mitochondria, peroxisomes, and glyoxysomes) protects cells against the deleterious effects of superoxide free radicals. • Manganese has a role in tricarboxylic acid cycle (TCA) in oxidative and non-oxidative decarboxylation reactions. <p>Zinc</p> <ul style="list-style-type: none"> • Zinc is involved in many enzymatic activities such as dehydrogenase, proteinase, peptidase <i>etc.</i> • Zinc is involved in the synthesis of indole acetic acid, metabolism of gibberellic acid and synthesis of RNA .

- Because of its preferential binding to sulphhydryl group, Zn plays an important role in the stabilization and structural orientation of the membrane proteins.
- Zinc influences translocation and transport of P in plants. Under Zn-deficiency, excessive translocation of P occurs resulting in P-toxicity.

Copper

- Copper is a constituent of number of enzymes.
- Copper is important in imparting disease resistance to the plants.
- It enhances the fertility of male flowers.

Molybdenum

- Molybdenum is a component of nitrate reductase, nitrogenase, xanthine oxidase/dehydrogenase and sulphite oxidase.
- Biological nitrogen fixation (BNF) is catalysed by the Mo-containing enzyme, nitrogenase (essentially comprising of Mo-Fe-S protein and a Fe-S cluster protein) which directly transfers electrons to N_2 . Because of its involvement in BNF, Mo requirement of nodulated legumes is particularly high.
- Nitrate is reduced by nitrate reductase (NR) enzyme in cytoplasm by transfer of electrons from Mo to NO_3^- . Owing to close relationship between Mo supply, nitrate reductase activity (NRA) and plant growth, NRA has been used as an indicator of status of Mo in plants.
- Molybdenum is involved in protein biosynthesis through its effect on ribonuclease and alanine aminotransferase activity.
- Molybdenum affects the formation and viability of pollens and development of anthers.

Boron

- It is responsible for the cell wall formation and stabilization, lignification and xylem differentiation. As a consequence, B-deficiency causes changes in chemical composition and ultrastructure of cell wall, accumulation of toxic phenols, inhibition of lignin synthesis and a decrease in the production of indole acetic acid (IAA)(Figure 2). Decrease in IAA is responsible for the induction of Ca-deficiency.
- It imparts drought tolerance to the crops. Regular boric acid sprays help in mitigating harmful effects of drought.
- Boron plays a role in pollen germination and pollen tube growth.
- It facilitates ion uptake by way of increasing the activities of plasma-membrane bound H^+ -ATPase (H^+ -adenosine triphosphatase).

		<ul style="list-style-type: none"> • It facilitates transport of K in guard cells as well as stomatal opening. <p><i>Nickel</i></p> <ul style="list-style-type: none"> • Nickel is associated with nitrogen metabolism by way of influencing urease activity. In systems where urea is used as the sole N fertilizer for foliar spray and Ni supply is poor, lower urease activity causes urea toxicity to the foliage and leads to severe necrosis of the root tips. • In free-living <i>Rhizobia</i>, adequate Ni supply ensures optimum hydrogenase activity. • It facilitates transport of nutrients to the seeds or grains. <p><i>Chlorine</i></p> <ul style="list-style-type: none"> • It plays a major role in osmoregulation (cell elongation, stomatal opening) and charge compensation in higher plants. • It acts as a cofactor in Mn-containing water splitting enzyme of photosystem II. • Chlorine in abundance suppresses the plant diseases, viz. grey leaf spot in coconut palms, take-all and common root rot in wheat, common root rot and <i>Fusarium</i> root rot in barley, stalk rot in corn, stem rot and sheath blight in rice, hollow heart and brown centre in potatoes, <i>Fusarium</i> yellows in celery, and downy mildew in millet. • Chlorine supply improves the nutritional quality of vegetables by preferentially lowering the NO₃⁻ -N concentration in tissues.
ii)	What are single Micro-nutrients & Mixture of Micro-nutrients?	There is no standard definition of single micronutrients and mixture of micronutrients.
iii)	What are Plant Growth regulators (PGRs)? What are their functions in the plant?	<ul style="list-style-type: none"> ➤ PGRs: Plant growth regulators defined as organic compounds other than nutrients that affect the physiological processes of growth and development in plants when applied in low concentrations. Plant growth regulators are active at low concentrations (1-10 ng / nl) in promoting, inhibiting or modifying growth and development. ➤ They are either natural or synthetic compounds that are applied directly to a target plant to alter its life processes or its structure to improve quality, increase yields, or facilitate harvesting. In modern agriculture, people have established the benefits of extending the use of plant hormones to regulate growth of other plants. When natural or synthetic substances used in this manner, they are called Plant Growth Regulators. <p>Role:</p> <ul style="list-style-type: none"> ➤ Plant hormones are produced naturally by plants and are

		<p>essential for regulating their own growth. They act by controlling or modifying plant growth processes, such as formation of leaves and flowers, elongation of stems, development and ripening of fruit etc.</p> <ul style="list-style-type: none"> ➤ Plant hormones rarely act alone, and for most processes-- at least those that are observed at the organ level-many of these regulators have interacted in order to produce the final effect. <p>Examples:</p> <ul style="list-style-type: none"> ➤ (a) Classical plant hormones (auxins, cytokinins, gibberellins, abscisic acid, ethylene) and growth regulatory substances with similar biological effects. ➤ (b) More recently discovered natural growth substances that have phytohormonal-like regulatory roles (polyamines, oligosaccharins, salicylates, jasmonates, sterols, brassinosteroids, dehydrodiconiferyl alcohol glucosides, turgorins, systemin, unrelated natural stimulators and inhibitors), as well as myoinositol. Many of these growth active substances have not yet been examined in relation to growth and organized development in vitro.
iv)	<p>Kindly give examples of Plant Micro Nutrients and Plant Growth Regulators naturally found. Kindly also give examples of Plant Growth Regulators and Plant Growth Hormones which are produced industrially and sold in the market,</p>	<p>Micro Nutrients: Iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), boron (B), molybdenum (Mo), nickel (Ni) and chlorine (Cl) are classified as plant micronutrients.</p> <p>Plant Growth Regulators Naturally Found:</p> <ul style="list-style-type: none"> ➤ The plant hormones are identified as promoters (auxins, gibberellin and cytokinin), inhibitors (abscisic acid and ethylene) and other hypothetical growth substance (florigen, flowering hormone, etc.,) ➤ More recently discovered natural growth substances that have phytohormonal-like regulatory roles (polyamines, oligosaccharins, salicylates, jasmonates, sterols, brassinosteroids, dehydrodiconiferyl alcohol glucosides, turgorins, systemin, unrelated natural stimulators and inhibitors), as well as myoinositol. <p>Plant Growth Regulators which are produced industrially are listed in Table 1.</p>
v)	<p>Are Micro-nutrients and Plant Growth Regulators (PGRs) one and the same?</p>	<p>These are different.</p>

Table 1: LIST OF MARKETED PLANT GROWTH REGULANTS WITH ACTIVE INGREDIENT/S

Active ingredient/Formulation/Concentrate			Product Name	Company Name	Crops
AUXINS					
2-(1-naphthyl)acetic acid	SL	45 g/l	Planofix		Apple Pear Pineapple
4-indol-3-ylbutyric acid	DP	1 g/kg	Seradix B No 1		Ornamentals
4-indol-3-ylbutyric acid	DP	3 g/kg	Seradix B No 2		Ornamentals
4-indol-3-ylbutyric acid	SL	8 g/kg	Seradix B No 3		Ornamentals
GIBBERELLINS					
Gibberellins	SL	32 g/l	ProGibb 4%		Grape, Pear, Citrus, Potato, Mango, Hops, Grape-seedless
CYTOKININS					
6-benzyl adenine/gibberellins	SL	19/19 g/l	Promalin		Apple, Plum, Flowers, Ornamentals
ETHYLENE					
Ethephon	SL	480 g/l	Ethrel		Apple, Cherry, Citrus, Cotton, Grape, Maize, Peach, Pineapple, Plum, Prune and Sugarcane Tobacco
GROWTH RETARDANTS					
Paclobutrazol	SC	250 g/l	Cultar		Litchi Mango Peach Plum
Daminozide	SP	850 g/kg	B-Nine SP		Flowers Ornamentals
Glyphosate-isopropylamine	SL	360 g/l	Glyphosate 360 Acid		Sugarcane and Grasses (chemical mowing)
Glyphosate-isopropylamine	SL	360 g/l	Mamba 360 SL		Sugarcane Grasses (chemical mowing)
Glyphosate-isopropylamine	SL	360 g/l	Roundup		Grasses (chemical mowing) Sugarcane
Glyphosate-isopropylamine	SL	360 g/l	Roundup Ultra		Sugarcane Grasses (chemical mowing)
GROWTH INHIBITORS					
Mepiquat chloride	SL	50 g/l	Pix		Cotton
Chlormequat chloride	SL	750 g/l	CeCeCe 750		Pear, Wheat
Chlormequat chloride/ethephon	SL	300/150 g/l	Uprite		Wheat
DEFOLIANTS					
Thidiazuron/diuron	SC	120/60 g/l	Dropp Ultra		Cotton
GROWTH STIMULATORS					
Brassinolide	SL	0.1%	Double		Agril. and Hortil. crops

*SL – Liquid Suspension; WP – Wettable Powder; EC – Emulsifiable Concentrate; DP – Powder Dust