

# FERTILIZER MANAGEMENT IN TEA



INSTITUTE OF HIMALAYAN BIORESOURCE TECHNOLOGY (CSIR), PALAMPUR  
An ISO 9001:2000 Certified Institute

**(Released under the Tea Board of India sponsored project)**



## Need of fertilizer application

In generally 16 nutrients are essential for normal plant growth and crop production. Plants derive 3 major nutrients from air and water, and the remaining from soil. However, 3 nutrients viz, Nitrogen (N), Phosphorus (P) and Potassium (K), which are required in large amount, are not adequately available in the soil to support the sustained production and needed to be applied through external fertilizers. It has been reported that production of 1000 kg tea-leaf (dry weight)

removes 40-50 kg nitrogen, 4-8.5 kg phosphorus and 16-19 kg potash. Besides, stems and older leaves also lock about 50 kg nitrogen, 12 kg phosphorus and 32 kg potash. Weeds growing in tea field absorb substantial quantity of the nutrients and if removed from the fields, result in their permanent loss. The removal of nutrients, thus, has to be compensated by their external application. Besides, response of other nutrients viz., sulphur, magnesium, zinc etc. is being noticed in high productive gardens.



## Role of fertilizers

### Nitrogen

- It promotes vegetative growth, improves shoot succulence, shoot size and leaf size, and lowers *banjhiness*. It reduces flowering and fruit setting.
- It governs utilization of phosphorus and potassium by the bush.
- It is an essential constituent of plant substances viz., protein, chlorophyll, hormones, alkaloids and vitamins.

### Phosphorus

- It stimulates root formation and growth.
- It counteracts the effect of excess nitrogen.
- Being a constituent of nucleic acid, it is closely concerned with the vital growth processes. It is essential for synthesis of starch, protein and fat.

### Potassium

- It is essential for frame development. It provides resistance against drought, frost, pest and diseases.
- It has synergistic effect with nitrogen.
- It acts as an accelerator of enzyme action.



## Application of fertilizers

### Fertilizer doses

For the tea plantations in Himachal Pradesh, the following interim recommendation is being given:

- General recommendation of fertilizer dose is 90 kg nitrogen (N), 90 kg phosphorus ( $P_2O_5$ ) and 90 kg potash ( $K_2O$ ) per ha.
- The estates getting yield above 1500 kg made tea (approximate 6000 kg green leaf) per ha should increase dose of nitrogen up to 120 kg/ha.
- During pruned year, the potash application should be raised to 120 kg/ha, keeping in view its requirement for frame formation.

For exact recommendation of the fertilizers, the growers are advised to maintain section-wise crop yield and soil-nutrient status data.



## Calculation of fertilizer dose

Dose of any fertilizer can be calculated by using following formula:

$$\text{Quantity of fertilizer required} = \frac{100 \times \text{Dose of nutrient}}{\text{Nutrient content}}$$

For example, if 90 kg nitrogen per ha is to be applied through Ammonium sulphate fertilizer, containing 20.6 % nitrogen (N), the quantity of



Ammonium sulphate needed would be:

$$\text{Quantity of Ammonium sulphate} = \frac{100 \times 90}{20.6}$$

= 437 kg, say 9 bags per ha (1bag = 50 kg)

The ready reckoner given below may be used for fertilizer application:

Fertilizer	*For 1ha (25 kanal)	
	Unpruned Tea	Pruned Tea
Ammonium sulphate	9-12 bags	9 bags
Alternate year Urea	4-5 bags	4 bags
Single Super Phosphate	11 bags	11 bags
Muriate of Potash	3 bags	3-4 bags

\*Dose of phosphorus and potash may be reduced if their available status in the soil is very high

### Time of application

After thorough mixing, the fertilizers should be applied before the onset of plucking season i.e. during February- March after rain when there is sufficient soil moisture. In pruned sections, the fertilizer should be applied after the first flush i.e. in June when the bushes attain sufficient foliage

### Method of application

In wide-spaced sections, where the ground coverage is not complete, apply the fertilizer



mixture in a broad ring corresponding to the periphery of the bush frame. In sections where ground coverage is complete and the bushes are

compact, it will be practically difficult to apply fertilizers in a ring. In such case, apply fertilizer between the rows in a broad band or broadcast it uniformly all over the ground, avoiding the dumping or heaping of the fertilizers within the bush frame or at the collar level.

The fertilizer may be applied in a single split (March) or in two splits (March and June) as per the convenience. However, in gardens where extra dose of fertilizer is needed, it should be applied in two splits.

In case of young tea, nitrogen, phosphorus and potash fertilizers should be applied in the ratio of 3:2:4 with nitrogen dose of 20, 40, 60 and 80 kg per ha in the first, second, third and fourth year of planting, respectively in the ring method.

## Properties of commonly used fertilizers

### (a) Nitrogenous fertilizer

**Ammonium sulphate (SoA):** Most widely used fertilizer in tea, increases soil acidity, is less hygroscopic and has greater chemical stability; white to yellowish grey in colour and contains 20.6% nitrogen and 24% sulphur.

**Urea:** Most concentrated nitrogenous fertilizer containing 46% N; white crystalline, fairly hygroscopic, and soluble in water; partially lost by volatilization if applied on dry soil. It is also more suitable for foliar application than other nitrogen fertilizers as it causes less scorching.





## (b) Phosphatic fertilizers

**Single super phosphate (SSP):** Most commonly used phosphatic fertilizer containing 16% phosphate and 12% sulphur and 20% calcium; ash coloured, available in powder and granular forms.

**Rock phosphate:** Contains 18-25% phosphate, insoluble in water but soluble in acidic soil solution; required to be placed at 15-25 cm depth in soil. Mussoori rock phosphate (MRP) - the black powder, containing 18-20% phosphate - is considered better than others.

## (c) Potassic fertilizers

**Muriate of potash (MoP):** Cheaper source and most commonly used potassic fertilizer containing 60% potash and is reddish or dull white crystalline material.

**Sulphate of potash:** Dirty white powdery material containing 50% potash.

## (d) Mixed fertilizers

The fertilizers containing more than one nutrients are called mixed fertilizers, e.g. IFFCO mixture (12:32:16) contains 12% N, 32% P and 16% K. In case such mixed fertilizer are to be used, calculate its dose based on highest content of the nutrient (e.g. 32%  $P_2O_5$  in case of IFFCO mixture) and calculate the outstanding balance of the remaining two nutrients which has to be compensated through their other sources. Then recalculate the required dose of these fertilizers.

## IMPROVING FERTILISER USE EFFICIENCY

- Only recommended doses and sources of fertilizer should be used.
- Different fertilizers should be mixed shortly before use, particularly when urea is being used.
- Fertilizer should be applied only when there is

sufficient soil moisture.

- Fertilizer should not be applied in the centre of tea bush, otherwise it will damage it.
- Initial soil nutrient status and crop production level should be known for accurate recommendation of fertilizers.
- For optimum response, ensure that other factors of production are not limiting. For example, it is no use to apply fertilizers when yield is limited on account of poor drainage or poor weed, disease and insect management or low plant population etc.
- Fertilizer application will be a waste when the whole crop could not be plucked.
- Retaining pruning litter on the soil surface helps in maintaining soil fertility and its biological properties, and thus reduction in the fertilizer requirement. Similarly, shade and fertilizer requirement are also very closely related.

## SOURCE OF FERTILIZERS, THEIR CONVERSION FACTOR AND UNIT COST

Fertilizer	Nutrient content	*kg fertilizer required for 1 kg nutrient	Price of fertilizer (Rs/kg)	Unit cost of nutrient (Rs)
SoA	20.6% N	4.85	6.37	30.92
Urea	46% N	2.17	4.83	10.50
CAN	25% N	4.00	10.56	42.24
SSP	16% $P_2O_5$	6.25	3.80	23.75
MRP	20% $P_2O_5$	5.00	2.60**	13.00
MoP	60% $K_2O$	1.67	4.46	7.43

\*Conversion factor; \*\*Estimated

### CONTACT

**Director**  
Institute of Himalayan Bioresource Technology  
Post Box No. 6, Palampur 176061  
Himachal Pradesh  
Phone: 01894-230411  
E-mail: [director@ihbt.res.in](mailto:director@ihbt.res.in)  
Web: [www.ihbt.res.in](http://www.ihbt.res.in)