

## A new recommendation on bioactive amino acid formulation in tea\*

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In 1997, Tea Scientific Department released a schedule for plant growth regulators (PGRs) integrating the foliar application of micronutrients and NK/antitranspirants for imparting the drought tolerance in young and mature tea. The released schedule is mainly focused on PGRs to enhance the crop productivity while NK and antitranspirants schedule was suggested in view of sustenance of bush health during soil moisture stress.

In recent years, a number of Indian and International entrepreneurs entered into the Agri-input market with a variety of commercial PGR formulations. Five bioactive formulations of amino acid mixtures were evaluated since 2007 for crop productivity. Among them, Kadostim 20 (a.i. amino acid mixture, an organic cell pathway synthesized, biostimulator enhancing potassium leaf nutrient complex) supplied by M/s. Inagrosa Industries Agro Biologicals, Madrid, Spain performed well. Initially, the experiment was conducted in clonal tea field (3<sup>rd</sup> year from pruning) where integrated shear harvesting was implemented.

Significant improvement in yield and biochemical constituents with an overall increase in quality parameters of made tea were observed due to foliar application of bioactive amino acid formulation, Kadostim 20 at various concentrations. Yield enhancement was attributed to favourable physiological activities which in turn induced more secondary metabolites responsible for the quality constituents.

The optimum concentration of Kadostim was fixed as 300 ml/ha in 200 L of water and further experimented in heterogeneous seedling population to confirm its bioefficacy. The experimental block entered into third year from pruning cycle and continuous shear harvesting was practiced. There were two different foliar application schedules i.e. 1) foliar application during lean periods (November, December, January and February/March) and 2) foliar application coinciding the high crop seasons (April, May, September and October). Demonstration plot receiving Kadostim treatment registered substantial yield increase over the absolute control. Since the foliar application of micronutrients and recommendations on PGRs synchronized with crop periods, combination of micronutrients and Kadostim was tried as one of the treatments where micronutrients alone served as control.

Considerable yield enhancement was noticed when compared to foliar application of micronutrients alone under the prevailing conditions of the Anamallais. Yield recorded after initial four applications of Kadostim during soil moisture stress facilitated crop improvement. As per manufacturer's claim the guaranteed composition of Kadostim 20 is total N 5% (aromatic N 1.6%, nitric N 3.1%, organic N 0.3%), organic matter 2.0%, soluble K<sub>2</sub>O 6.0% and bioactive amino acids 3.75%. The active ingredients could facilitate effective water relations resulting in higher crop. Here it may be recalled that the recommendation on foliar application of NK is made to impart

\*Abridged summary of the paper published in the *Planters' Chronicle* Vol. 106 (6): 9-16  
 Issued to the *Handbook of Tea Culture*, Section 24, p.2. UPASI Tea Research Foundation, Tea Research Institute, Valparai 642 127, Coimbatore District, Tamil Nadu. Issue dt. Sept., 2011

drought tolerance in tea plants. Since the Kadostim contained both N and micronized K that could have imparted similar effect identical to foliar application of NK as urea and MOP.

Confirmatory demonstration experiments were extended to other agroclimatic zones of southern India (Coonoor, Vandiperiyar and Munnar) with minor modifications. Foliar application of Kadostim recorded higher yields with substantial banji bud reduction in the harvest and results obtained in Munnar are comparable with that of the Anamallais. Differential crop response (Kadostim registered as high as 11.2% in crop season and 5.5% during lean season) obtained in the Nilgiris may be attributed to two important variables. Primarily, the field selected for the experimentation was of first year from rejuvenation pruning where rejuvenated plants highly respond to topical application of foliar nutrition. Secondly, it could be due to the altitude and prevailing climatic conditions. It has been established that K is an important element which is highly essential to the plants recovering from pruning. Kadostim contains relatively higher quantum of micronized K and being the fields recovering from rejuvenation, foliar applied Kadostim might be utilized for the internal requirement of the plants. Yield level stagnated due to severe tea mosquito and grey blight incidence and hence expected benefits were not realized at Vandiperiyar. However, Kadostim had an edge over other treatments.

Crop response varied markedly from region to region under prevailing conditions of respective agro-climatic zones, jat/hybrids, age after pruning and cultural operations implemented thereon. Due to labour scarcity, plantations are forced to adopt continuous shear/mechanical harvesting which affected the bush health. In order to nullify the adverse effects, package of practices trial is being conducted wherein Kadostim 20 is also included in one of the schedules.

Except the cost of Kadostim, there is no additional recurring expenditure on spraying since the formulation is compatible with micronutrients. Cost economics evolved with foliar application of Kadostim is guaranteed for a minimum returns of 1:2 (field yielding about 2000 kg/ha) and as high as 1:7 (field yield of ~3500 kg/ha) over and above savings in labour provided the formulation is applied along with micronutrients.

Based on the multi-locational experiments it is recommended that foliar application of Kadostim may be adopted for better crop promotion in tea under south Indian agro-climatic conditions. Member estates interested in using the foliar application of bioactive amino acid formulation, Kadostim application may be adopted either during crop or lean periods which in turn nullifies the adverse effect of shears during crop season and impart drought tolerance during soil moisture stress.