

## Udhayam(High Yielding Banana Variety)



Tamil Nadu farmers were in search of a substitute for the local Karpuravalli, which belongs to the Pisang Awak subgroup of the genomic group ABB because of its high susceptibility to leaf spot diseases and nematodes. Despite the consumers' preference both in the rural and urban markets, marketing of Karpuravalli was a failure mainly because of the poor yield. This led to the birth of Udhayam, which is a single plant selection made at NRCB, Trichy. Prior to release, this variety was evaluated under varied agroclimatic conditions and the results revealed that it performed well not only in Tamil Nadu but also in Kerala, Andhra Pradesh, Karnataka, Bihar and Tripura. It produced a sustained yield even under saline-sodic soils. Though it produced an average yield of 37 kgs, it has the potential to yield upto 45 kgs, which is 15-30% higher than local Karpuravalli. It exhibited field tolerance to nematodes and other leaf spot diseases. The cylindrical shape of the bunch makes this variety amenable for long distance transport with enhanced shelf life.

Udhayam was also tested in two of farmers' fields at Trichy namely Mr.Dharmaraj of Koppu village and Mr. Ammaiah Raj of Malliyampathu village. Their positive feedback and interactions with the fellow farmers during variety release meeting increased the demand among the farmers for the newly released variety Udhayam. Overwhelmed by their performance and yield in

particular, two progressive farmers. Mr.S.Tamilarasu of Uppiliyapuram, Trichy District, Tamil Nadu and Mr.S.Sundaram of Thirukkattupalli, Tanjore District, Tamil Nadu procured tissue culture plants of Udhayam. They wanted to check their yield stability by cultivating them in a small scale. They adopted the advanced package of practices recommended by the Institute with minor modifications. Nutrient management was done in an excellent manner taking care of both soil and foliar applications to tap its yield potential fully. Their enthusiasm on banana cultivation has led to the identification of superior clones with 22-24 hands yielding about 50-60 kgs and fetching a market price of Rs. 800-1000/- per bunch.

## Modified high density planting with fertigation in Banana



High density planting system with fertigation (tap system) developed by NRCB is an improved technology suitable for the drought situation by saving 30-40% water and also increased the fertilizer efficiency by 25%. By planting 4500 plants/ ha (1.8x3.6m distance with 3 suckers/ hill) and 5200 plants with 1.2x1.2x2.0m spacing increased the land use efficiency. The bunch weight and fruit quality were as comparable to that of conventional planting (3080 plants/ha). Due to the prevailing drought situation in Tamil Nadu especially in Trichy district, many farmers have adopted this technology. Many progressive farmers namely Shri Mariappan of Thudaiyur village, Trichy District, Shri Gunasekaran, Manavasi, Karur District have adopted these technology for Robusta Banana. The technology is becoming popular in major Banana growing areas in

Pollachi and Annur areas in Coimbatore districts Pudukottai and Alangudi areas in Pudukottai district.

By adopting this modified high density planting with fertigation, farmer's have expressed that the growth, bunch weight and yield of Banana were better than the conventional planting system with flood irrigation. Additional profit of Rs.30,000 to 40,000/- could be obtained by adopting this technology with a saving of 25% in fertilizer and 30-40% in water.

## Fertilizer tailoring for targeted banana yield and sustainable soil health

### Validation of fertilizer tailoring equations for Grand Naine banana:

The following fertilizer tailoring equations for Grand Naine, developed at NRC for Banana were validated in two different locations like Pazhur and Sirugambur villages in Tiruchirapalli district.

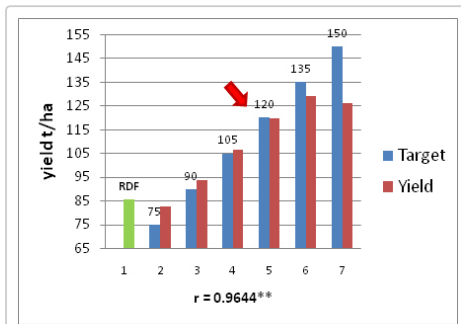
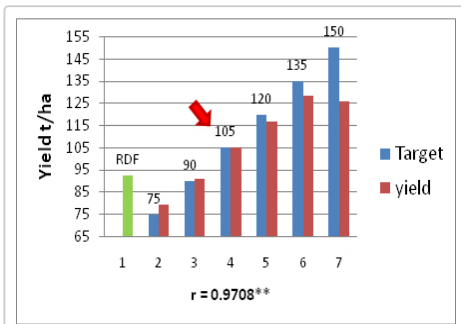
- $FN = (8.80 * T) - (0.73 * SN) - (0.32 * ON)$
- $FP = (0.84 * T) - (0.77 * SP) - (0.37 * OP)$
- $FK = (11.21 * T) - (0.44 * SK) - (0.39 * OK)$

where, FN, FP & FK are NPK requirement through fertilizer (kg/ha), SN, SP & SK are NPK available in the soil (kg/ha), ON, OP & OK are NPK requirement through organic manure (kg/ha), and T – yield target (t/ha).

At Pazhur, the initial soil NPK were 260kg, 19kg and 311kg per hectare respectively and at Sirugambur, they were 158kg, 8kg and 226kg, respectively. Based on these initial soil test values and above equations/ready reckoner, the NPK requirements (in grams) per plant were worked out for the yield targets of 75, 90, 105, 120, 135 and 150 tons per hectare and are given in the table 1. Simultaneously, the blanket recommendation of fertilizer dose (BRFD) of 200:30:350 g NPK/plant was also maintained for comparison.

Under Pazhur condition, when the blanket recommendation of NPK (200:30:350 g NPK/plant) was applied the actual yield recorded was 92.4t/ha with the Benefit to Cost (B:C) ratio of 2.77. The highest B:C ratio of 3.65 was observed with actual yield of 128.4 t ha<sup>-1</sup>, when the adjustment equations were applied for yield target of 135 t ha<sup>-1</sup>. With the increasing targets from 75t/ha to 90t/ha, the actual yields were slightly above the targets, with B:C ratio ranging from 2.51 to 2.80. The nutrient dose, targeting 105t/ha exactly produced the same (actual) yield of 105t/ha with B:C ratio of 3.14, which is more than that with blanket recommendation. At this target (105t/ha), 13.6% more yield was obtained than that with the blanket recommendation, with additional investment of just Rs.954.89 per ha due to fertilizer. Beyond this target level, with increasing targets, the actual yield increased with diminishing rate, up to the target, 150t/ha i.e., the actual yields were less than the targets but more than that with blanket recommendation. When the B:C ratios were observed between the targets 105t/ha and 150t/ha, the highest B:C ratio of 3.65 with actual yield of 128.4t/ha was observed at the target, 135t/ha. Beyond this target (135t/ha), the B:C ratio started declining. Thus, under Pazhur condition, the fertilizer tailoring equations for Grand Naine, holds good up to the target 105t/ha, if actual yield is the concern and holds good up to the target 135t/ha, if the return per unit investment due to fertilizer is the concern (Fig.1).

Under Sirugambur condition, the NPK blanket recommendation produced yield of 85.5t/ha with B:C ratio of 2.57. The highest B:C ratio of 3.64 was worked out with the application of NPK in relevance to these fertilizer tailoring equations aiming the yield target of 135t/ha, which actually recorded an yield of 129.3t/ha. The actual yields increased with increasing rate, as the target increased from 75t/ha to 120t/ha and were more than or on a par with the target. Beyond this target, 120t/ha, the actual yield increased with diminishing rate. The nutrient application in relevance to these equations, aiming the target of 120t/ha produced an actual yield of 119.7t/ha (with B:C ratio of 3.46), which is on par with the target and 39.8% more yield was obtained than that with the blanket recommendation. A gradual increase in B:C ratio from 2.59 to 3.64 from the target of 75t/ha to 135t/ha and beyond that it declined. Thus, under Sirugambur condition, this set of fertilizer tailoring equations for Grand Naine, holds good up to the target 120t/ha, if actual yield is the concern and holds good up to the target 135t/ha, if the return per unit investment due to fertilizer is the concern (Fig.2). (Note: Costs of NPK are Rs.16.5, Rs.58.75 & Rs.30 per kg and market price of fruit is Rs.9/kg – for calculation of B:C ratio).



Banana is a highly perishable fruit with a shelf life of only 6-7 days under normal conditions. Processing of Banana into shelf stable product can reduce the post harvest losses during glut season and also the farmer fetch a better profit when engaged into sale of value added product than fresh fruit. The process for production of 'Banana Fig' from ripe Banana fruit was developed and standardized at National Research Centre for Banana. The product is sticky in consistency and very sweet in taste. It has a shelf life of 3-4 months under ambient condition when wrapped in moisture proof plastic wrappers. This technology was commercialized through sale of technical know - how to enthusiastic entrepreneurs. So far Five entrepreneurs have bought this technology from NRCB and are in different stages of setting up of production unit. The process was also popularized by imparting training to 35 potential entrepreneurs so far from different places in Tamil Nadu and Gujarat.



One of the early birds among the entrepreneurs, Mr. T. Mariappan, has started commercial production of Banana figs and is successfully marketing in Trichy and surrounding cities. Before entering into the business of making value added products in Banana, Mr. Mariappan, an Electronics Engineer, was engaged in cultivation of paddy and Bananas in his ancestral lands in Trichy district. But he was continuously incurring huge losses due to lack of proper price for the paddy and Bananas. As the marketing system in Trichy was not scientifically regulated, he could not fetch a fair price for paddy or Banana. He was much concerned about the similar fate of several of his fellow farmers also. He happened to visit NRCB for an advice on solving his and his fellow farmer's problem in marketing of the produce. After knowing about the possibilities of value addition in Banana, he decided to undergo training on 'Value Addition in Banana' at NRCB, Trichy. He and his brother Mr. T. Sivakumar, underwent a training programme on

production of different value added products of Banana during 26-30th August 2002 at Postharvest Technology Laboratory of NRCB, Trichy. After undergoing the training they decided to go in for production of 'Banana Fig' commercially. In early 2003 they started their company in the name of "EVER GREEN FOOD PRODUCTS" and started making and selling Banana fig under the brand name of "BANANA GOLD". After struggling for six months in establishing his foothold in the market, he now has plans to spread his brand in other major cities of India. To day he not only consumes the entire Bananas produced in his own farm but also buys huge volumes from his fellow farmers. Initially he was selling his product for Rs.80/- per kg, which he is now being able to sell at Rs.160/- per kg. Now he has plans to expand his factory for enhancing the production capacity and bankers have agreed to give him a loan of Rs.20 Lakhs for the project. His old worries of not fetching a fair price for his farm produce is gone and is now looking out for bigger market for his value added product.

## Banana pseudostem trap for Banana weevil



Banana weevils - Corm weevil, *Cosmopolites sordidus* and Stem weevil, *Odoiporus longicollis* are the key pests causing considerable damage. Yield loss to the extent of 10-30 per cent was recorded. If it's not checked it may be up to 100 per cent. The yield loss due to the pest varies depending on the stage of the crop at which the pest attacks the plant. Annual crop loss on a moderate scale would be 3.6 crores in Tamil Nadu alone. In Coimbatore, a farmer could get only Rs.10,000/- from an area of 10 acre (12000 plants cv. Nendran) due to stem weevil problem. If the stem weevil is controlled, the farmer should have got an income of Rs.6.0 lakhs). This is not an exceptional; this will become a rule, if the pest problem is not checked properly.

**Weevil attraction:** The host plant released volatile chemicals, which attracts the insects. Cut surface of pseudostem and corm emanates a host of volatile chemicals, which are chemically known as 'Plant kairomones', which attracts all Banana weevils. With the principle in mind, Banana pseudostem/corm trapping was conducted in areas endemic to Banana weevils in different parts of India (Sirumalai –Dindigul District., Maruthur - Karur District, Mutharasannallur-Trichy District, Kolli hills -Namakkal District, Mandya, Erasakanaikanur - Theni Districts of Tamil Nadu and Mahadevpura- Mandya- District, Karnataka).

**Preparation of traps:** From the harvested plants, pseudostem and corm traps are prepared as follows.

Banana pseudostem trapping @ 100 ha was evaluated under endemic areas indicated it's effectiveness. This is used for monitoring as well as controlling the weevils. It attracts all Banana weevils. The longitudinal split pseudostem traps. The harvested plants are cut into pseudostem traps. Split the pseudostem of 30cm length longitudinally in to two halves and the cut portion of the stem is to be kept on the soil surface near the plant. Such traps @ 100/ha can be kept in the garden. These traps are checked once in a week. Disc on-stump: This trap can be made by cutting harvested stump 25 cm above the ground level for stem weevil, and at the ground level for corm weevil and keep a 10cm thick circular stem over the stump. Keep few pebbles in between the disc and the stump, to facilitate the entry of weevils to the stem and to release volatiles from cut surface to dissipate in the air. ©. Corm split trap: After harvest, the dugged out the corm and made into bigger pieces and keep the cut surface facing ground near the plants.

These traps were evaluated under different production systems. 1. Garden land system under hill condition (625m m.s.l) at Sirumalai Pudur, Dindigul District during 2000-2001. A farmer contacted NRCB to get rid of the stem weevil problem in one of the sites in his estate. Several plants (150 plants/ 1000) had stem weevil infestation. This pest destroyed the plants. The grower applied mud slurry on the pseudostem. But he could not achieve control. NRCB demonstrated Banana pseudostem trapping method to the grower and though he did not had enough material for trapping, transported from near by garden and trapping was conducted by him and with in three months almost all the available weevils in his garden were eliminated and the grower thanked NRCB for the timely advise, which has helped him to avoid yield loss due to Banana stem weevil to the extent of 30-50 per cent.

Another grower at Kolli hills in Namakkal District having cv.Namran a (Pome group AAB) had severe incidence of BSW. Grower after seeing the Banana approached NRCB for controlling the pest. By adopting pseudostem-trapping technology, the grower was able to trap the weevils and get rid of the pest with in a period of six months. During Director's visit to Kolli hills, the grower expressed his happiness.

A private farm managed by a charitable institution having cv.Ney Poovan (Pome group AB) in eleven sites under garden land in Sri Rangapatina taluk in Mandya District. In charge of the farm contacted NRCB for the management of corm weevil without use of chemicals/ pesticides. NRCB suggested pseudostem-trapping technique for the control of the weevils. They are able to control both the weevils.

**Advantages:** It is a simple technology to be adopted easily by the farmers, under garden land production system. Where, the number of plants / mat is more and harvesting is being done regularly, so there is a continuous supply of pseudostem material required for trapping.