Chapter 4

Integrated Discussion
Chapter 4

The present study was undertaken to investigate the evaluation of the efficacy of some practices conventionally used for the production of local cultivars of China banana – ABB (Musa paradisica) in Andaman: An environmental physiological study, were undertaken with the objective to find out the effect of planting systems on growth, yield and quality of China banana- ABB (Musa paradisiaca), optimize the fertilizer schedule through fertigation under different planting systems, study the influence of growth regulators on yield and quality of China banana planted under different systems and also work out the economics of different treatments.

Plant height was significantly influenced by planting system. China banana planted under normal system i.e., one sucker pit⁻¹ (P₁) significantly registered taller plants in all the stages than high density planting (P₂). It recorded a mean plant height of 90.60 cm, 179.00 cm, 326.83 cm during 3rd and 5th, 7th and 9th month of observations. Plant height is an indicator of growth performance of the crop as influenced by environment and management factors. In general, plant height of banana progressively increased from planting to shooting as the stage advances.

The interaction effect among planting system and fertigation levels during the 9th month was found to be significant. Normal planting and fertigation level at 100 percent (F₁) significantly influenced the plant height, followed closely by normal planting (P₁) and fertigation level at 125 percent. However, three way interaction viz., planting system, fertigation levels and growth regulators were found to be non-significant.

The various fertigation levels significantly influenced the girth of the pseudostem. A significant increase in the girth of pseudostem was noticed under fertigation 125 percent recommended N K g pit⁻¹(F₄) during 3rd and 9th month of observation, maximum pseudostem girth was recorded with fertigation level at 100 per cent recommended N K g pit⁻¹(F₁). The least was observed with fertigation at 50 per cent recommended N K g pit⁻¹(F₁) in all the stages of growth. However, F₁ and F₄ were found to be on par during 3rd, 5th and 7th month of observation.
Chapter 4

There was no significant interaction among the planting system, fertigation levels and application of growth regulators during 3\textsuperscript{rd}, 5\textsuperscript{th}, 7\textsuperscript{th} and 9\textsuperscript{th} month of observations. However, many interactions between planting system and fertigation levels were found to significantly influence the pseudostem girth. Maximum pseudostem girth was registered under the combination of normal planting and fertigation at 125 percent (P\textsubscript{1} F\textsubscript{4}).

Among the various fertigation levels, fertigation at 125 per cent recommended N K g Pit\textsuperscript{1} (F\textsubscript{4}) retained the highest number of functional leaves in banana recording a mean number of 8.90 cm, 17.22 cm, 18.56 cm, and 19.07 cm functional leaves 3\textsuperscript{rd}, 5\textsuperscript{th}, 7\textsuperscript{th} and 9\textsuperscript{th} month respectively. It was closely followed by fertigation at 100 percent (F\textsubscript{1}) which registered a mean number of 8.77 cm, 17.08 cm, 18.45 cm and 18.17 cm functional leaves at all the stages. The lowest number of functional leaves was recorded at 50 per cent recommended N K g Pit\textsuperscript{1} (F\textsubscript{1}) which registered a mean number of 8.77 cm, 17.08 cm, 18.45 cm and 18.17 cm functional leaves at all the stages. The lowest number of functional leaves was recorded at 50 per cent recommended N K g Pit\textsuperscript{1} (F\textsubscript{1}) in the growth stages. Application of growth regulators did not show any significant influence on number of functional leaves during the 3\textsuperscript{rd}, 5\textsuperscript{th}, 7\textsuperscript{th} and 9\textsuperscript{th} month. The interaction among the planting systems, fertigation levels and growth regulators was found to be non significant in all the stages of growth.

Earliness in shooting was observed in normal planting system (P\textsubscript{1}) than high density planting. Normal planting system came to shooting on 284\textsuperscript{th} days while high density planting took 342 days to shoot. Among the fertigation levels, fertigation at 125 percent recommended N K g pit\textsuperscript{1} showed earliness in shooting (278) followed by 100 percent recommended N K g pit\textsuperscript{1} (303 days), while delayed shooting was observed from fertigation at 50 percent recommended N K g pit\textsuperscript{1} which significantly extended the shooting and shooting was noticed on 340 day. There was no significant interaction among the planting systems, fertigation levels and growth regulators.

Different planting system caused significant influence on the number of hands bunch\textsuperscript{-1}. Increased number of 7.15 hands bunch\textsuperscript{-1} was recorded from normal planting (P\textsubscript{1}). Lowest
number of 6.83 hands bunch\(^{-1}\) was associated with high density planting (P\(_2\)). Among the fertigation levels, fertigation at 100 per cent recommended NK g Pit\(^{-1}\) (F\(_1\)) produced the highest number of hands bunch\(^{-1}\) (7.41). Fertigation at 125 percent recommended N K g Pit\(^{-1}\) (F\(_3\)) recorded higher number of hands bunch\(^{-1}\) (7.22) and second in order, while the least was obtained from fertigation at 50 percent recommended fertilizer (6.59). Application of growth regulators significantly influenced the number of hands bunch\(^{-1}\). Application of Panchagavya at 3 percent recorded significantly higher number of (7.16) hands bunch\(^{-1}\) than that of GA\(_3\) application at 50 ppm (6.83). The interaction effect among the planting systems, fertigation levels and growth regulators exhibited significant influence on the number of hands bunch\(^{-1}\). The highest number hands bunch\(^{-1}\) was observed from the combination of normal planting with fertigation at 100 percent recommended N K g pit\(^{-1}\) and application of Panchagavya at 3 percent (G\(_2\)). Lower number of hands bunch\(^{-1}\) were obtained from high density with fertigation at 75 percent recommended N K g pit\(^{-1}\) and application of GA\(_3\) at 50 ppm (G\(_1\)), followed by the combination of high density planting combined with fertigation at 50 percent recommended N K g pit\(^{-1}\) and application of GA\(_3\) at 50 ppm which was also found to be on par with each other.

The number of fingers hand\(^{-1}\)was significantly influenced by planting systems. Normal planting system registered significantly higher number of fingers hand\(^{-1}\) (7.51) than high density planting (7.10). Different fertigation levels registered significant influence on the number of fingers hand\(^{-1}\). Higher number of fingers hand\(^{-1}\) was recorded with fertigation level at 100 percent recommended N K g pit\(^{-1}\) followed by fertigation at 125 percent recommended NK g pit\(^{-1}\) and lowest number of fingers hand\(^{-1}\) was recorded from 50 per cent recommended NK g pit\(^{-1}\). Growth regulators exerted significant influence on the number of fingers hand\(^{-1}\). Application of Panchagavya at 3 per cent (G\(_2\)) registered the highest number of 7.46 fingers hand\(^{-1}\) while application of GA\(_3\) at 50 ppm (G\(_1\)) recorded lower number of 7.15 fingers hand\(^{-1}\). Significant interaction was found among the planting system, fertigation levels and growth regulators. The highest number of fingers hand\(^{-1}\) was obtained from normal planting (P\(_1\)), fertigation level at 125 percent of recommended N K g (F\(_3\)) and application of Panchagavya at 3 percent (G\(_2\)).
Chapter 4

Integrated Discussion

Normal planting system ($P_1$) registered significantly higher number of 69.96 fingers bunch$^{-1}$, while high density planting system recorded lower number of 66.05 fingers bunch$^{-1}$. Fertigation levels showed significant influence on the number of fingers bunch$^{-1}$. Fertigation at 100 per cent recommended N K g pit$^{-1}$ ($F_1$) recorded highest number of 75.26 fingers bunch$^{-1}$ followed by fertigation at 125 percent recommended N K g pit$^{-1}$ ($F_4$) with mean number of 74.53 fingers bunch$^{-1}$. Lower number of 60.00 fingers bunch$^{-1}$ was recorded from fertigation level at 50 percent recommended N K ($F_2$). Among the growth regulators, application of Panchagavya at 3 percent ($G_2$) recorded higher number of 68.60 fingers bunch$^{-1}$ than application of GA$_3$ at 50 ppm $G_2$ (67.40). With regard to the interaction effect, higher number of fingers bunch$^{-1}$ was registered from the combination of normal planting with fertigation level at 100 percent recommended N K g pit$^{-1}$ and application of Panchagavya at 3 percent than the other combinations. Lower number of fingers bunch$^{-1}$ was observed under $P_2 F_2 G_1$.

Application of Panchagavya at 3 percent ($G_2$) obtained the highest finger weight (83.91 g) than that of GA$_3$ at 50 ppm ($G_1$) (81.65 g). The interaction effect among the planting systems, fertigation levels and growth regulators exerted significant influence on the finger weight. Normal planting, fertigation at 100 percent recommended NK and application of Panchagavya 3 percent ($P_1 F_1 G_2$) recorded maximum finger weight followed by normal planting ($P$), fertigation at 100 percent recommended NK g pit$^{-1}$ ($F_1$) and application of GA$_3$ 50 ppm ($G_1$) which was found to be on par with each other.

Normal planting system ($P_1$) recorded significant increase in fruit length (11.00 cm) than high density planting ($P_2$) (10.70 cm). The fruit length was significantly increased with the fertigation levels. The mean length of finger was higher (11.77 cm) with fertigation level at 100 per cent recommended NK g pit$^{-1}$ ($F_2$), while finger length was lower (9.76) with fertilization level of 50 percent recommended N K g pit$^{-1}$ ($F_2$). Application of Panchagavya at 3 percent ($G_2$) recorded the highest fruit length of 11.08 cm, than that of GA$_3$ application at 50 ppm ($G_1$) (10.62 cm). The interaction effect of planting systems, fertigation levels and growth regulators significantly influenced the fruit length. Length of fruit was recorded from
normal planting (P₁) fertilization at 125 percent recommended NK (F₄) and application of Panchagavya at 3 percent (G₂). While the least was recorded from high density planting (P₂), fertigation at 50 percent recommended fertilizer (F₂) and application of GA₃ at 50 ppm (G₁).

Heavier bunch weight was noticed under normal planting system (P₁) which recorded a mean bunch weight of 11.55 kg plant⁻¹. High density planting (P₂) recorded significantly lower bunch weight of 8.84 kg plant⁻¹. Different fertigation levels exerted significant influence on the bunch weight. Fertigation at 125 percent recommended N K (F₄) yielded the highest bunch weight of 12.25 kg plant⁻¹ followed by fertigation at 100 percent recommended N K (F₃) recording bunch weight of 11.48 kg plant⁻¹. Lowest bunch weight was obtained from 50 percent recommended N K with 7.99 kg plant⁻¹. Among the growth regulators, application of Panchagavya at 3 percent (G₂) significantly recorded higher weight (10.28 kg plant⁻¹) than GA₃ 50 ppm (G₁) (9.95 kg plant⁻¹). Individual bunch weight was significantly influenced by the interaction effect existed among planting systems, fertigation levels and growth regulators. The combination of normal planting system with fertigation at 125 percent recommended N K and application of Panchagavya at 3 percent (P₁ F₄ G₂) recorded the highest individual bunch weight (14.40 kg plant⁻¹) followed by the combination of P₁ F₄ G₂ (14.20 kg plant⁻¹) which was also found to be on par. The lowest individual bunch weight was recorded from P₂ F₂ G₁ (6.99 kg plant⁻¹).

Among the growth regulators, application of Panchagavya at 3 percent recorded higher content of total soluble solids (21.70⁰Brix) than the application of GA₃ at 50 ppm (19.06⁰Brix). Interaction among the planting systems, fertigation levels and growth regulators exerted significant influence on the content of total soluble solids. The combination of normal planting (P₁), fertigation at 100 percent recommended NK g pit⁻¹ (F₄) and application of Panchagavya at 3 percent (G₂) recorded the highest content of total soluble solids and the least from the combination of high density planting (P₂), fertigation at 50 percent recommended N K g pit⁻¹ (F₂) and application of GA₃ at 50 ppm (G₁).

The economic analysis of the investigation revealed that planting systems, fertigation levels and growth regulators influenced the gross return, net return and B.C ratio. High density
planting with fertigation level of 125 percent of recommended N K and application of *Panchagavya* at 3 percent (P2 F2 G2) recorded the highest net return of Rs 155121 ha⁻¹. Maximum gross return was obtained from the above treatment which was followed by high density planting, fertigation level at 125 percent recommended NK g pit⁻¹ and application of GA3 at 50 ppm. Under normal planting system, the highest net return and gross return of Rs 88988 and Rs 177500 respectively was obtained from fertigation at 125 percent recommended N K g pit⁻¹ and application of *Panchagavya* at 3 percent. Net return and gross return were minimum Rs 26725 and Rs 105000 respectively under normal planting, fertigation level at 50 percent recommended N K and application of GA3 at 50 ppm. However, the lowest cost of cultivation Rs 76905 was recorded from normal planting, fertigation level at 50 percent. In terms of B C ratio, the highest value (2.42) was recorded in high density planting system, with fertigation at 125 percent recommended N K g pit⁻¹ and application of *Panchagavya* at 3 percent. Lowest B.C. ratio (1.34) was recorded in normal planting system with fertigation at 50 percent recommended N K g pit⁻¹ and application of GA3 at 50 ppm. However, the B. C. ratio from normal planting was same (2.00) with fertigation at 100 and 125 percent recommended N K g pit⁻¹ along with application of *Panchagavya* at 3 percent.

Based on the above investigations, it could be concluded that, intercropping of fruit crops like banana and plantain with allied enterprises provides a possible solution to meet the demand for food commodities to ensure nutritional security of tribal and non tribal households while supporting the stability of agro - ecosystem components existing in this area.

There are some constrains in the cultivation of China banana which need to be removed so that farmers could adopt new technology to increase productivity. Strong wind during rainy season and drought like condition in dry period (January – April) affect yields. Therefore shooting during high wind time is avoided by adjusting time of planting. Non availability of the suitable planting materials and other inputs continues to be stumbling blocks for increase production. The inflow of research information to the farmers by the state agricultural agencies is very meager.
From the present investigation, it can be concluded that suckering and good management practices are indispensable for higher yields of banana. In general, plants with excess suckers removal performed better than leaving outgrowths attached to the mother plants as in conventional farmer’s practice. Therefore, proper management practices must be adhered to otherwise farmers may not tap the full potential management practices.

The extension agencies concentrates mostly on coconuts and their attention in banana or other fruit crop is very limited. Lack of institutional credit, low level of fertilizer consumption, absence of banana based cropping system, absence of proper marketing machinery to ensure a fair and legitimate return to the producer.

Lack of fruit processing unit are some of the institutional and technological problems for which the creditable success to be achieved by the production of banana is bound to suffer a setback. Experimental result on production of banana indicated the banana is a potential fruit crops.

The marked attainment of banana in islands agriculture can make socio-economic upliftment of the tribal and non – tribal farming community of this island. Looking to the prospects and potential of banana in this island, an integrated investigation of crops soil-water relationship and appropriate crop designing is needed to increase production and productivity of banana.

Recently consumer demand for organic banana is increasing in India as well as in the international market. In such condition, banana can be successfully cultivated by organically owing to the favourable conditions existing in these islands. This technology can also be directly implemented in these islands with the promising experience of Kerala and Tamil Nadu. Preliminary work like selection of site and farmer, standardization of agro techniques may process with the help of state government for promoting organic farming in these islands.