CHAPTER VI

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An investigation “Effect of intercrops with or without biofertilizers on yield and quality of mango cv. Amrapali” was carried out from 2007-2009 at Government progeny orchard, Khandagiri, Bhubaneswar, Department of Horticulture, Government of Odisha. The experiment was conducted in randomized block design with seven treatments and three replications. Intercrops like pineapple cv. Queen, turmeric cv. Roma, and ginger cv. Suprava were grown as intercrops on six year old mango orchard. Intercrops were grown with application of biofertilizers and chemical fertilizers. Nutrient management and cultural operations were carried out as per the standard recommendations. The biofertilizers *Azosporillum* and *Azotobacter* were applied at the rate of 60kg per hectare incubated with farm yard manure. Biometrical observations on vegetative characters (plant height, plant girth, number of lateral, number of leaves, leaf area), flowering characters (number of panicles, length of panicle, breadth of panicle, flowering duration), yield attributing characters (number of fruits per panicle at mustard stage, pea stage, marble stage, number fruits per plants, average weight of fruits, mango yield per plant, mango yield quintal per hectare, yield of intercrops quintal per hectare, total yield (yield of mango + conversion of yield of intercrops to mango equivalent yield) quintal per hectare) and quality
parameters (pulp weight, weight of stone and peel, TSS, acidity) were recorded. The economic analysis was also calculated.

The height and girth of the plant were recorded highest in T₆ (ginger with application of biofertilizers) followed by T₇ (ginger with application of inorganic fertilizers) and minimum was recorded in control (T₁). The spread of the plant in the direction of north and south was found highest in T₄ (turmeric with application of biofertilizers) followed by T₆ (ginger with application of biofertilizers) and minimum in control. The spread of the plant in the direction of east and west was also found highest in T₆ (ginger with application of biofertilizers) followed by T₄ (turmeric with application of biofertilizers) and minimum in control. The number of laterals per sq.m was recorded highest in T₇ (ginger with application of inorganic fertilizers) and minimum in T₃ (pineapple with application of inorganic fertilizers).

The intercrop ginger along with biofertilizers produced maximum lateral followed by turmeric and minimum in pineapple. The leaf area was significantly higher in T₆ (ginger with application of biofertilizers) followed by T₄ (turmeric with application of biofertilizers) and minimum in control. The leaf area was also observed significantly higher due to application of biofertilizers and minimum in inorganic fertilizers.

The number of panicles, length of panicle, breadth of panicle were also recorded maximum in T₆ (ginger with application of biofertilizers) followed by T₇ (ginger with application of inorganic fertilizers), T₄ (turmeric with application of biofertilizers) and T₅ (turmeric with application of inorganic fertilizers).
Maximum numbers of panicles per sq.m were found highest with ginger intercropping followed by turmeric and minimum in control. The application of biofertilizers produced maximum number of panicles per sq.m (34.2) and increased the length and breadth of panicle over control.

The total number of flowers per panicle (4524.5), number of perfect flowers per panicle (972.8), number of male flowers per panicle (3551.7) and sex ratio was also highest in T6 (ginger with application of biofertilizers) and minimum in control. Ginger with application of biofertilizers induced maximum number of perfect flowers and also sex ratio was maximum.

The final number of fruits per panicle (2.8) was highest in T4 (turmeric with application of biofertilizers) followed by T6 (ginger with application of biofertilizers) and minimum in control. The number of fruit set was also influenced by biofertilizers application. The interaction effect between intercrops and fertilization was found non significant. Percentage of fruit drop was recorded maximum in ginger with application of biofertilizers during mustard stage to pea stage and minimum in turmeric with application of biofertilizers. Also minimum fruit drops were recorded between marble stage to final retention of fruits in turmeric. The number of fruits per plant were recorded highest in T4 (turmeric with application of biofertilizers) 35.7 followed by T2 (pineapple with application of biofertilizers) and minimum in control.

The average weight of fruit was highest in control followed by ginger, turmeric and pineapple. The yield per plant was highest in turmeric (9.22 kg) and
minimum in control (5.51 kg). The total yield was also recorded highest in T₄ (turmeric with application of biofertilizers) in 2007, but in 2008 T₂ (pineapple with application of biofertilizers) recorded the highest yield. T₄ recorded maximum average yield 181.09 quintal per hectare followed by T₅ (turmeric with application of inorganic fertilizers) and minimum in control. The intercrops also increased the yield of mango compared to control.

The bio-chemical analysis like pulp weight, weight of stone and peel was found non-significant. The TSS was recorded highest in T₆ (ginger with application of biofertilizers) followed by T₄ (turmeric with application of biofertilizers) and minimum in T₃ (pineapple with application of inorganic fertilizers). There was no significant variation recorded in acidity of fruit.

The highest gross return was recorded in T₄ (turmeric with application of biofertilizers) Rs.5,07,038.00 followed by T₅ (Turmeric with application of inorganic fertilizers) Rs.4,03,074.00 and minimum in control Rs.62,020.00. The net return was also highest in turmeric with application of biofertilizers with cost benefit ratio of 1:3.3 and income of control was 1:1.02. The correlation study revealed that girth of the plant, laterals produced, length and breadth of panicles significantly correlated on total yield. The weight of the fruit was also correlated with yield.

The intercrop pineapple did not produce any fruit in first year, but in second year 232.67 quintal per hectare of pineapple was harvested. Similarly
during two years of study the total yield of ginger and turmeric was 43.27 quintal per hectare and 86.53 quintal per hectare respectively.

Growing of intercrops like ginger, turmeric and pineapple with biofertilizers and inorganic fertilizers in mango orchard revealed that maximum mango yield was recorded intercropping with turmeric with application of biofertilizers (36.87 quintal per hectare) followed by intercropping with ginger with application of biofertilizers (34.47 quintal per hectare), intercropping with pineapple with application of biofertilizers (33.93 quintal per hectare) and minimum was recorded in control (22.07 quintal per hectare) where no intercrop was grown over the two years of investigation. The percentage increase of yield over control is 40%. The application of biofertilizers also increased the yield over control and inorganic fertilizers to the tune of 48% and 20% respectively. The yield of intercrops when converted to mango equivalent yield it was found that in turmeric with application of biofertilizers maximum monetary return was recorded of Rs.5,07,038.00 followed by turmeric with application of inorganic fertilizers of Rs.4,03,074.00 and minimum was recorded in control. The benefit cost ratio was recorded highest in turmeric with application of biofertilizer 1:3.3 and in control it was 1:1.02.

From the present investigation it can be concluded that growing of turmeric, ginger and pineapple as intercrops along with biofertilizers recorded maximum benefit in comparison growing Amrapali mango alone.