7. SUMMARY

In the present investigation, the effect of biofertilizers (*Azotobacter, Mycorrhizae* and *Rhizobium*) in the form of mono, dual and combined inoculation on morphological, biochemical changes, yield, percentage yield of oil and physio-chemical properties of oil in *Arachis hypogaea* L. var TMV-7 (Groundnut) were analysed.

*Arachis hypogaea* (Groundnut) belongs to the family *Fabaceae* which is an important food, feed and principal oilseed crop.

Biofertilizers are the source of microbial inoculants, which have brought hopes for both economically and environmentally.

For this study the experiments were conducted using biofertilizers in mono, dual and combined form like *Azotobacter, Mycorrhizae, Rhizobium, Azotobacter + Mycorrhizae, Azotobacter + Rhizobium, Mycorrhizae + Rhizobium, Azotobacter + Mycorrhizae + Rhizobium* and uninoculated control.

Compared to control, all the biofertilizers inoculated seeds showed more germination percentage. The highest germination percentage was found in combined inoculation of biofertilizers.

The root and shoot length gradually increases up to 56\(^{th}\) day in all the inoculations. But maximum growth was observed in combined inoculation of biofertilizers.
The fresh weight and dry weight of groundnut increases from 0 to 56th day. The maximum value was observed in plants treated with combined inoculation of biofertilizers.

The number of leaves, leaf area and leaf area index showed maximum value in combined inoculation of biofertilizers and the minimum value was in control.

Biofertilizer induced root length which increases the number of root nodules. The maximum number of root nodules was observed in combined inoculation of biofertilizers.

The minimum number of flowers was recorded in combined biofertilizer inoculated plants. The highest number and weight of pods per plant were noticed in combined biofertilizers inoculated plants. The vegetative growth and yield were induced in the combined inoculated plants.

The pigments (Chlorophyll and carotenoid) were noticed high in combined inoculation of biofertilizers. A progressive decline in chlorophyll and carotenoid content from vegetative stage to reproductive stage was observed.

The highest carbohydrate content in seed was observed in plants inoculated with combined biofertilizers. The lowest amount of carbohydrate was observed in control.

The combined biofertilizers inoculated plant seed showed the more amount of sugar than control and other inoculations.

The enzyme activities like polyphenol oxidase, peroxidase and catalase were increased in the senescence stage and decrease in the flowering stage. The
combined inoculation of biofertilizers showed the maximum amount of enzyme activities.

The extraction of maximum amount of oil was noticed in plants inoculated with combined biofertilizers.

The refractive index of oil showed the little significant variation that is higher in combined inoculation.

The chemical properties of oil like saponification value and Iodine value were showed more amount in combined inoculations than other inoculations. The less amount was noticed in control.

The free fatty acid and peroxide value showed that the highest value in control and the lowest value was observed in combined inoculation.

The estimation of protein by HPLC Method showed the maximum number and amount of protein profile was in combined inoculation of biofertilizers.

The above observations point out that maximum morphological, biochemical, yield, oil yielding percentage, physiochemical properties of oil were recorded in *Arachis hypogaea* var. TMV-7 treated with combined inoculation, than that of the other inoculations. The free fatty acid and peroxide values were higher only in the control than the inoculations of biofertilizers.
8. CONCLUSION

Critics have argues that Green Revolution simply borrowed production from future generation as it impoverished soil and destroyed ecological balances. The Government of India has been promoting the use of biofertilizers in agriculture through the state government. Biofertilizers lessen the environmental burden emanating from the chemical compounds. They act as nutrient suppliers and soil conditioners. Good soil condition is imperative to increase crop production, as well as human and animal health welfare.

The use of bacteria *Azotobacter*, *Rhizobium* and *Vesicular arbuscular mycorrhizae fungi* as biofertilizers to supplement nitrogen and phosphorous fertilizers have shown considerable improvements in the growth of *Arachis hypogaea*. The co-inoculation allow the plants to have a more balanced nutrition and absorption of nitrogen, phosphorous and other mineral nutrients.

From the present study, it is concluded and recommended that the combined inoculation of biofertilizers on *Arachis hypogaea* L. var TMV-7 was more effective than control and other inoculations. Combined inoculation of biofertilizers are also more environmentally sound and they could help to mitigate the onset of global warming due to water, soil pollution and also reduce the fertilizer input cost of farmers.