CHAPTER- VI

SUMMARY AND CONCLUSION
SUMMARY OF ANALYSIS OF WATER SAMPLES

From the seasonal analysis of quantification of chemical fertilizer residues and physico-chemical characterization of soil and water samples from six taluks of Mysore district, following observations were made. During the present investigation, six taluks from Mysore district were selected for the present investigation. From each taluk, fifteen soils and fifteen water samples were collected over a period of 2011-2013. To study the seasonal variations in chemical fertilizer residues along with physico-chemical characteristics, soil and water samples were collected from selected taluks during rainy, winter and summer seasons. A comparative study has been carried out in order to study the extent of pollution caused due to application of chemical fertilizers on agricultural soil and water resources in Mysore district. From the seasonal analysis during 2011-2013, following observations were made from the experimental results with respect to different seasons of all taluks of Mysore district. A variation in chemical fertilizer residues and physico-chemical constituents were observed for both borewell, channel and lake water samples are summarized as follows:

1. From the mean values of borewell, channel and lake water samples of all the taluks, it was found that, highest concentration of urea residues were recorded in winter and rainy seasons and lowest values were reported in summer season. In comparison with all the taluks, highest concentration of urea residues was recorded in Nanjangud taluk, T.Narasipura and Hunsur taluks.

2. In case of DAP residues, it was observed that, highest values of DAP residues were reported in winter and rainy seasons and lowest values in summer season. In comparison, to all the taluks, highest concentration of DAP residues were recorded in Mysore, T.Narasipura and Hunsur taluks water samples.

3. Highest pH values were recorded in winter, rainy seasons and lowest values in summer season. In comparison to all the taluks, highest values were recorded in Mysore taluk, followed by Nanjangud taluk, T.Narasipura and Hunsur taluks. During the study period from, 2011-2013, variations in pH were found to be within the permissible limits of WHO standards.
4. The season-wise TDS concentration was found to be high during rainy season, followed by winter and summers. In comparison to all the taluks, high TDS concentration was reported in Piriyapatna taluk water samples.

5. In all the seasons, carbonates concentration was found to be higher and bicarbonates concentrations were within the desirable limits of WHO standards. Highest concentrations were reported in borewell water samples of Piriyapatna and a lowest value was recorded in channel water samples of H.D Kote taluk.

6. In majority of the taluks, higher values of total hardness were observed during winter and rainy seasons. In comparison to all the taluks, higher values were reported in H.D Kote, Hunsur and Piriyapatna taluks.

7. During the present study, in all the seasons, the mean values of calcium were found to be above the permissible limits in taluks such as, T.Narasipura, Hunsur, H.D Kote and Piriyapatna. In all the taluks, higher values were recorded in winter and summer seasons.

8. In comparison to all the taluks, the mean values for magnesium and chloride were within the permissible limits of WHO standards.

9. Highest concentration of sodium were recorded in Mysore taluk. In rest of the taluks, the concentrations were found to be within the permissible limits. From the seasonal analysis, highest concentration of sodium were reported in winter, rainy seasons and lowest values were recorded in summer season.

10. In all the taluks, during all the seasons, the concentration of potassium was found to be higher in comparison to WHO standards.

11. In all the taluks, during all the seasons, the concentration of nitrate and potassium were higher in comparison to WHO standards.

12. In case of nitrite, a tracer amount was detected in some of the water samples, higher concentrations were recorded for borewell water samples of Nanjangud and T.Narasipura taluks.

13. In all the taluks, phosphate concentrations were found to be higher than the desirable limits. From the seasonal observations of mean values, higher concentrations were recorded during winter, rainy and summer seasons. In all the taluks, phosphate was found to be higher in borewell water samples rather than channel waters.
14. The mean values of sulphates for all the water samples of all the taluks were found to be within the permissible limits of WHO standards. Higher values were recorded in T.Narasipura, Nanjangud and Mysore taluks with respect to rainy, followed by winter and summer seasons.

**SUMMARY OF ANALYSIS OF SOIL SAMPLES**

1. From the seasonal study, it was observed that, in all the taluks, high values of urea residues were reported during rainy season in Nanjangud, H.D Kote taluks. In rest of the taluks, higher values were reported in winter season. In summer season, the mean values for urea residues were found to decrease.

2. The higher values of DAP residues were recorded in rainy, summer and lower in winter seasons. During the present study, in comparison to all the taluks, it was observed that, high concentration of DAP residues were recorded in Piriyapatna and Hunsur taluks. In rest of the taluks, the concentrations were found to be at moderate levels.

3. In all the taluks, high values of moisture content were recorded in rainy season, followed by winter.

4. The bulk densities were found to increase from winter to summer seasons. Lowest mean values were reported during summer season.

5. The variation in porosity values were observed; higher values were recorded during rainy followed by summer and winter seasons. Except Piriyapatana, in rest of the taluks, higher values for porosity were recorded.

6. The seasonal variations in pH of all the taluks, it was found that, high mean values were recorded in H.D Kote taluk. In Mysore, Nanjangud, T.Narasipura, Hunsur and Piriyapatna taluks, an increasing trends were observed during rainy, summer and winter seasons. In taluks such as, T.Narasipura and Hunsur taluks, an increasing trends were observed during rainy, winter, followed by summer seasons. For non-agricultural soil samples, the pH was found to be 7.4. A slight variation in pH was observed in all the seasons. In some of the soil samples, acidic pH was observed.
7. By comparing the mean values of conductivities of all the taluks, it was found that, higher mean values were reported in Piriyapatna taluk. An increased conductivity values were observed from rainy, winter followed by summer seasons. The conductivity values for all the soil samples were found to be within the normal range, reflecting that, all the soil samples have safe range of electrical conductivity.

8. In most of the soil samples, the concentrations of calcium and magnesium were found to be less. Highest mean values were recorded during rainy and winter seasons. Lowest concentrations were recorded in summer season. In comparison to all the taluks, higher values were recorded in T.Narasipura, H.D Kote, Hunsur and Piriyapatna taluks and lowest were recorded in Nanjangud taluk.

9. During the present investigation, the organic carbon content in agricultural soil was found to increase in rainy season followed by winter season. In summer season, the organic carbon contents were found to be less. For all the soil samples, the organic carbon was found to be higher compared to the normal range.

10. The chloride contents for all the soils, in all the seasons were higher. Higher chloride content was reported in Nanjangud taluk followed by H.D Kote, Hunsur and Piriyapatna taluks.

11. The total nitrogen content of all the soil samples in all the seasons were higher in comparison with normal range. Higher mean values for total nitrogen content were reported in Hunsur followed by H.D Kote and Piriyapatna taluks and lowest mean values in T.Narasipura taluk. Except non-agricultural soil samples, total nitrogen in all the agricultural soil samples, in all the seasons were found to be high.

12. During the present investigation, the nitrate content in all the samples showed high variations in all the seasons with respect to different taluks. In all the taluks, higher concentration of nitrate were recorded during rainy and summer seasons.

13. During the present study, the mean values for sodium in all the taluks showed variations in all the seasons. Higher values for sodium were recorded during summer followed by rainy seasons. In all the taluks,
lowest sodium concentrations were recorded during winter season. In comparison with all the taluks, highest mean values were recorded in Hunsur taluk followed by, H.D Kote and Piriyapatna taluks.

14. The mean values of potassium in all the season, showed, higher values in rainy, summer and lower during winter seasons. In comparison to all the taluks, higher mean values were recorded in Hunsur and Mysore taluks.

15. The high phosphate levels in all the sampling areas were found to be higher than the normal range. In comparison with all the taluks, highest mean values were recorded in Nanjangud and T.Narasipura taluks and lowest mean values were recorded in Mysore taluk. From the overall seasonal analysis of phosphates, it was found that, high mean values for phosphates were recorded in winter, rainy followed by summer seasons.

SUMMARY OF UREA DEGRADATION EXPERIMENTS

In both types of soils, the urea degradation was rapid at low amounts (2.5g). With the increase in number of days, the rate of degradation increased. After the 2nd day (D2) of urea treatment in different amounts, on soil surface, a number of small hole formations were observed. In all the treatments, there was an increase in pH due to the release of ammonia. Highest rise in pH was observed in brown soil compared to red soil. The rise in pH was due to increase in amount of urea, in both types of soils. The decline in soil pH was observed after 6th day (D6) in brown soil treated with 2.5 and 5g of urea. In both the soil types, with increase in number of days, in brown soil 96% degradation was achieved on 12th day (D12) for soil treated with 2.5g urea and 26th day (D26) for soil treated with 5g urea. With higher amount of urea, 95% urea degradation was achieved at 50th day (D50). In red soil, 94% and 95% degradation was achieved on 14th and 30th days (D14 and D30)) for soil treated 2.5 and 5g urea respectively. With high amounts of urea, the red soil had capacity to degrade only 54.8% with decreased nitrification process. The present study shows that, even at higher rate of urea application, the brown soil had capacity to degrade compared red soil. The present degradation experiments on urea under laboratory conditions provide a baseline information to field trial experiments and also help to develop fertilizer strategy management.
Conclusion: From the overall investigation of seasonal analysis of soil and water samples from various taluks of Mysore district, it can be concluded that, chemical fertilizers played a major role in regulating physical and chemical constituents of soil and water quality. One can also state that, judicious application of chemical fertilizers may help to maintain soil quality and productivity. However, it is necessary to apply liming material to reduce the acidifying effect on agricultural lands in order to maintain basic cation levels in soil. In order to overcome water pollution problems, introduction of legislation by the state government, restricting the application of chemical fertilizers, splitting of fertilizer dose at required concentrations will help to reduce pollution of surface and ground water.