

## CHAPTER V

### CONCLUSION

The combination of FTIR spectroscopy, Quasar and PLS-DA analytical model is effective in distinguishing *Spirulina* strains and can be developed as a proof of concept for strain classification with high reliability and satisfactory accuracy. This procedure is fast, non-destructive, and suitable for quality inspection of products in the market, protecting the rights of both producers and consumers. The study highlights the significant impact of environmental cultivation factors including photoperiod length, water source, and indoor versus outdoor cultivation systems on *Spirulina* biochemical profiles, particularly in protein and polysaccharide content. The research identified key spectral regions serving as biochemical fingerprints, with protein and polysaccharide regions emerging as primary markers responsive to environmental variations. In the future, this FTIR-based approach can be utilized to support identify the origin and cultivation methods of *Spirulina* products by analyzing their unique spectral signatures. This research paves the way for a more cost-effective and rapid method for distinguishing *Spirulina* samples and ensuring quality control in both laboratory and commercial algal production.