6.0. SUMMARY

Work carried on the brown seaweed *Sargassum wightii* is as follows.

1) Fluorescence analysis, of the dried powdered seaweed *Sargassum wightii* sample, treated sample and its extract in various solvents like chloroform, hexane, acetone, ethanol and distilled water.

2) Quantitative determination of moisture content, different ash types and extractive values from chloroform, hexane, acetone, ethanol and water.

3) Phytochemical screening of *Sargassum wightii* extract obtained from soxhlet extraction in successive solvents like chloroform, hexane, acetone and ethanol.

4) Quantification of protein, carbohydrate, lipid, nitrogen, organic carbon, fibre content, calorific value, phenol, tannin, anthocyanin, minerals (K, Ca, Mg and Na), vitamins (A, B3, C, and E) present in the *Sargassum wightii* powdered sample.

5) Evaluation of active compounds in *Sargassum wightii* by High Performance Thin Layer Chromatography (HPTLC) for Alkaloid, Flavonoid, Glycoside, Saponin, Steroid and Terpenoid confirmation.

6) Identification and quantification of amino acid and fatty acids in *Sargassum wightii* by High-Performance Liquid Chromatography (HPLC).

7) Evaluation of antidiabetic (antioxidant and hypoglycaemic) activity of ethanolic extract of *Sargassum wightii* in alloxan induced diabetic rats.
8) Evaluation of antiobesitic (hypolipidaemic) activity of ethanolic extract of 
*Sargassum wightii* in alloxan induced diabetic rats.

9) Biochemical evaluation of cardioprotective property of ethanolic extract of 
*Sargassum wightii* in Isoproterenol-Hcl induced myocardial infractioned albino rats.

10) Histopathological evaluation of cardioprotective property of ethanolic extract of 
*Sargassum wightii* in Isoproterenol-Hcl induced myocardial infractioned albino rats.

Based on the work carried out the following is the summary of the findings.

i. *S. wightii* powder as such, treated with 1N NaOH (aq.) and 50% H₂SO₄ showed 
brownish green fluorescence at long-UV 364nm whereas the same powder when 
treated with 1N NaOH (me.) and 50% HNO₃ exhibited reddish green fluorescence 
at long-UV 364nm. With 1N HCl, *S. wightii* powder showed brilliant green 
fluorescence at long-UV 364nm. In general, the seaweeds fluoresced at long-UV 
364nm respectively.

ii. Total ash content was more in *S. wightii* when compared with water soluble ash 
and acid insoluble ash values.

iii. In the case of ethanolic solvent extract value was more followed by chloroform 
and remaining solvents showed lesser extractive values. The chloroform and 
hexane extract of brown seaweed *S. wightii* showed the presence of all the 
biochemicals analyzed.

iv. The species *S. wightii* registered very high values for protein (232.21mgg⁻¹), 
carbohydrate (363.15mgg⁻¹) and organic carbon (332.20mgg⁻¹). The lesser values 
were obtained for lipid (81.32mgg⁻¹), calorific value (10.21KJb⁻¹) and fiber
content (3.12%). Highest value was observed for tannin (41.23mg g\(^{-1}\)) followed by phenol (3.42mg g\(^{-1}\)) and anthocyanin (0.096mg g\(^{-1}\)). Among the five inorganic minerals the sodium was found to be maximum (90.20mg g\(^{-1}\)) followed by that of magnesium (64.02mg g\(^{-1}\)) and calcium (63.03mg g\(^{-1}\)). Lesser amount of nitrogen (42.35mg g\(^{-1}\)) and potassium (34.01mg g\(^{-1}\)) was observed respectively. Among the four vitamins (A, B\(_3\), C and E), vitamin C (6.22mg g\(^{-1}\)) was found in large amount followed by that of vitamin E (2.10mg g\(^{-1}\)), vitamin A (631.60\(\mu\)g g\(^{-1}\)) and vitamin B\(_3\) (0.657mg g\(^{-1}\))

v. HPTLC analysis of S. wightii confirmed the presence of one type of alkaloid, glycoside, three types of saponins, one type of steroid (stigmasterol) and one type of trepenoid in S. wightii. Whereas flavonoid was found to be absent in this brown seaweed S. wightii.

vi. HPLC analysis of S. wightii for amino acids confirmed 21 amino acids were detected and quantified Glycine was found to the maximum extent followed by threonine and cystine. Among 21 amino acids, nine amino acids which are regarded as essential for humans (essential amino acids) namely phenylalanine, valine, threonine, tryptophan, isoleucine, methionine, leucine, lysine and histidine were found in quantifiable amounts in this brown seaweed Sargassum wightii. HPLC analysis of S. wightii for fatty acids confirmed, 6 fatty acids were detected and quantified. Two of them were saturated fatty acid (SFA) namely palmitic acid and stearic acid, one monounsaturated fatty acid (MUFA) oleic acid and three poly unsaturated fatty acid (PUFA) viz, linolenic acid, alpha linolenic acid and moroctic acid.
vii. *S. wightii* (25 and 50 mg/kg/p.o) treated rats exhibited significant (*P*<0.05) level of creatine phosphokinase (CPK) in alloxan-induced diabetic rats. With repeated treatment of *S. wightii* (25 and 50 mg/kg/p.o) for 21 days, the MDA levels were significantly reduced comparable to the normal rats.

viii. The percentage reduction in blood glucose levels after 12m (2h) in the *S. wightii* (25 & 50 mg/kg/p.o) treated rats showed *P*<0.001 level of significance when compared to that of normal-control rats. Treatment with the extract of *S. wightii* produced maximum reduction in blood sugar level at 60, 120 min in comparison to normal-controls rats. The effect was less pronounced at 30m indicating a late onset of the effect. After 3weeks (21days) of daily treatment with extract (25 & 50 mg/kg/p.o) led to a dose dependent fall in blood glucose level at (*P*<0.01) levels of significance.

ix. The continuous treatment with *S. wightii* (25 & 50 mg/kg/p.o) extract brought down the cholesterol, free fatty acids, phospholipids, and triglycerides in the diabetic-treated rats to almost normal. Treatment with *S. wightii* (25 & 50 mg/kg/p.o) extract lowered these lipoproteins in the diabetic-treated rats to nearly normal levels.

x. A significant decrease in myocardial enzyme lactase-dehydrogenase in heart (cardiac) tissue was observed in *S. wightii* (300 & 400 mg/kg/p.o) treated rats for 7, 11 and 15 days when compared to that of isoproterenol-induced rats but aspartate-transeferase increased when compared to that of alanine-transeferase in control, induced and *S. wightii* (300 & 400 mg/kg/p.o) treated rats. The levels of Vitamin C & E (non-enzyme) in myocardial-infracted rats were almost normal in
the pretreated ethanolic extract of *S. wightii*. A significant (P<0.05) decrease in the SOD and CAT enzyme in heart (cardiac) tissue was observed in isoproterenol-induced rats. The level of SOD and CAT enzyme activities are almost similar to that of normal-control rats. A significant (P<0.05) decrease in the glutathione peroxidase and reduced glutathione activities in heart (cardiac) was observed in isoproterenol-induced rats. The activities were near normal in the ethanolic extract of *S. wightii* (300 & 400 mg/kg/p.o) treated in isoproterenol-induced rats near normal. Glutathione is the substrate for the enzyme glutathione peroxidases, which metabolized hydrogen peroxides. The activities of lipid peroxidase and glutathione reductase also increased in isoproterenol-induced rats when compared with control rats, which are reverted in *S. wightii* (300 & 400 mg/kg/p.o) ethanolic extract treated rats.

xi. The rats given 300 mg/kg of *S. wightii* extract alone did not show any abnormal changes in the architecture of the heart. The administration of 400 mg of *S. wightii* extract treated rats exhibited normal endocardial and myocardial fibre with occasional focus of few inflammatory cells only.