SUMMARY

1. A review of literature pertaining to the investigation has been presented which deals mainly with changes in different biochemical parameters as a result of commonly encountered environmental stresses i.e. elevated temperature, drought and infection by different pathogens.
2. Materials and methods used in this investigation and experimental procedure followed have been discussed in detail.
3. Tea plants were subjected to three different types of environmental stress i.e. abiotic-elevated temperature and drought; anthropogenic- spraying with fungicide and insecticide and biotic- infection by *Exobasidium vexans*, causing blister blight disease.
4. Some of the important biochemical parameters such as changes in enzymes related to phenol metabolism i.e. phenylalanine ammonia lyase, polyphenol oxidase and peroxidase, changes in stress amino acid proline, chlorophyll content and quantitative and qualitative alteration of protein, and phenolics were tested.
5. Tea plants originating from three geographical regions of India were considered in this study to note whether any difference in their response to stress exist due to their origin.
6. Six Darjeeling varieties- BS/7A/76, T-78, B-157, T-135, AV-2& HV-39; seven Tocklai varieties- T-17/1/54, TV-9, Tv-18, TV-22, TV-23, TV-25& TV-26; and seven UPASI varieties- UP-2, UP-3, UP-8, UP-9, UP-26, BSS-2 & BSS-3 were chosen for different experiments.
7. Among the above twenty varieties ten were selected for whole plant elevated temperature treatment, six for drought treatment and only two for anthropogenic stress.
8. Results revealed that in all Tocklai varieties there was an initial increase in PAL activity upto 45^0C after which the activity declined. In all the Darjeeling and most of the UPASI varieties activity declined from 40^0C onwards in case of detached leaf temperature treatment. Significant variation in the inherent PAL activity was observed between different varieties.

9. Comparatively low activity of PAL was noticed in the seedlings in comparison to that of mature bush. Almost similar trend of result was observed in the seedlings after elevated temperature treatment.
10. In all the six varieties subjected to water stress PAL activity registered an initial increase at 4 days after which declined steadily, to register a significantly lower value at 12 days drought.
11. PAL activity declined significantly after each spray of fungicide and insecticide in relation to control. The difference of treatment with control was statistically significant from 2nd spray onwards.Significant decrease in PAL activity was also noticed in leaves following blister blight infection.
12. Elevated temperature treatment in general resulted in an increase in PPO activity up to 45 and 50^{0}C in case of TV and UPASI varieties and 40^{0}C in the Darjeeling varieties. Seedlings also showed similar trend after temperature elevation.
13. PPO activity in the water stressed plants showed an initial increase after 4 days of treatment in all the tested varieties. Further water stress however led to significant decrease in activity.
14. There was an increase in PPO activity in the leaves following 1st and 2nd spray with both fungicide and insecticide which then decreased after 3rd spray.
15. PPO activity was higher in the infected leaves in comparison to the healthy ones in all cases.
16. PO was found to be very heat labile enzyme. Activity was observed to decrease significantly after 40^{0}C and no activity could be detected after 50^{0}C in the detached leaf treatment. In case of intact plants PO activity sowed a steady decline at all elevated temperatures.
17. PO activity in leaves of plants subjected to water stress registered an increase up to 12 days in UPASI varieties and upto 4 days in the other two varieties.
18. Increased PO activity was noticed upto 2nd spray with hexaconazole and monocil and following blister blight infection .
19. Elevated temperature and drought did not alter the PO isozyme pattern whereas blister blight infection resulted in the appearance of two new isozyme bands in comparison to the healthy one.

20. Chlorophyll content decreased significantly at higher temperatures, particularly from 45^{0}C, following drought, after continued spray with fungicide and insecticide, as well as due to blister blight infetcion.
21. Gradual decrease in protein content was noticed with increase in temperature. When the whole seedlings were subjected to elevated temperature in some of the varieties there was an increase at 40^{0}C and then a decline. Prolonged period of drought also led to a decrease in protein content of all the tested varieties.
22. Slight decrease in protein content is observed after spraying with both fungicide and insecticide and about 33% reduction of protein content was observed after blister blight infection.
23. Appearance of 46KD new protein , associated with the loss of many protein bands was evident after temperature elevation in case of detached leaf treatment. No new protein band was noticed following elevated temperature treatment in the seedlings.
24. Enhanced accumulation of 42, 43, 46 and low molecular weight protein bands were evident following water stress with the appearance of a single 74KD new band.
25. Infection led to a loss of a number of protein bands, which was very prominent in the very young and mature stages.
26. Proline contet of tea leaves subjected to elevated temperatures showed an increase till 45^{0}C or 50^{0}C after which there was a decline.
27. Water stress induced very high accumulation of free proline in all the varieties, more prominently in the Darjeeling ones.
28. An increase in proline content following spray with fungicide and insecticide as well as blister blight infection was obtained.
29. Maximum variation both inherent and induced polyphenol content was noticed among the different varieties. Elevated temperature led to a decrease in phenol content in all Darjeeling avd some TV varieties. In varieties with high inherent phenol elevated temperatures did not induce any increase. On the other hand, in varieties with low inherent phenols , phenol contents increased significantly with the increase in temperature.

30. Both total and O-dihydroxy phenols showed increased accumulation following 4 and 8 days of water stress after which there was a decline following prolonged water stress.
31. High amount of phenol accumulation was noticed following 1st and 2nd spray with both fungicide and insecticide spray. Blister Blight infection also led to an increase in phenol content of tea leaves.
32. Antifungal activity of phenolics was detected by TLC plate and petri plate bioassay both among the healthy as well as infected tea plants. Decrease in antifugal phenolics was observed after infection. Temperature elevation did not alter antifungal phenolics significantly.
33. UV-Spectrophotometric analysis of antifungal phenolics showed the compounds from healthy and temperature stressed as well blister blight infected tea leaves, to have different absorption maxima.
34. Quantitative decrease in some catechin components was noticed after infection in HPLC analysis.