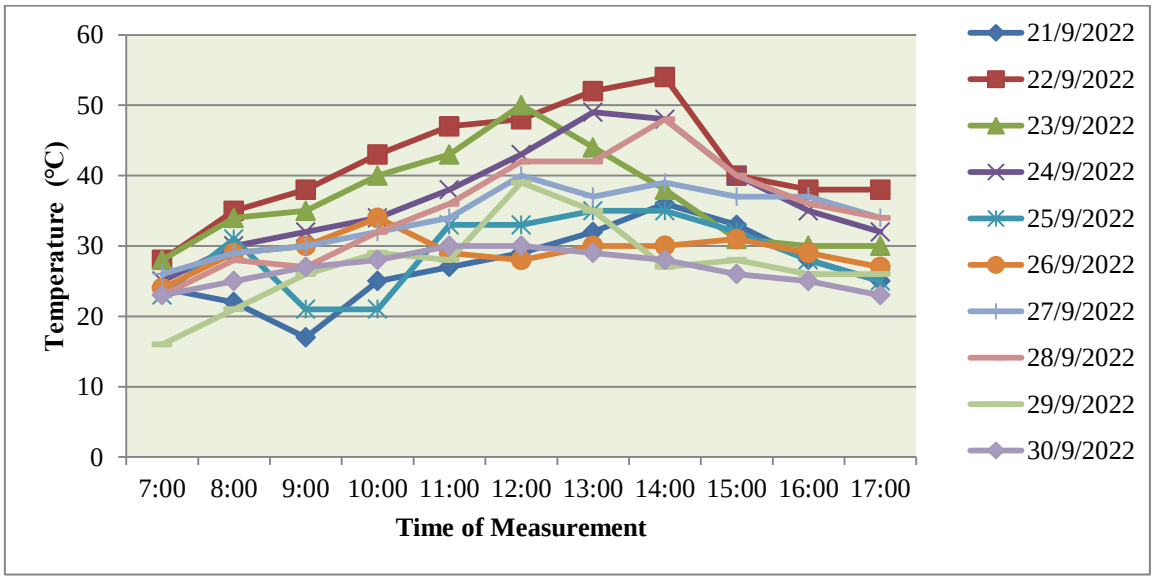
Creating greenhouse in the Tropics: FRI Arboretum in Yezin, Naypyitaw

With the aim of ex-situ conservation of temperate plant species, a greenhouse was established in the Arboretum located in Forest Research Institute, Yezin, Napyitaw, Myanmar. It is 23m x 12 mx 5 m using Polycarbonate for roofing and Tempered glass for the structure. Building greenhouse is very first experience for the Forest Research Institute as well as the Forest Department. It is a big challenges and exciting experience to plant the temperate species in the greenhouse as we have limited knowledge on cooling system.

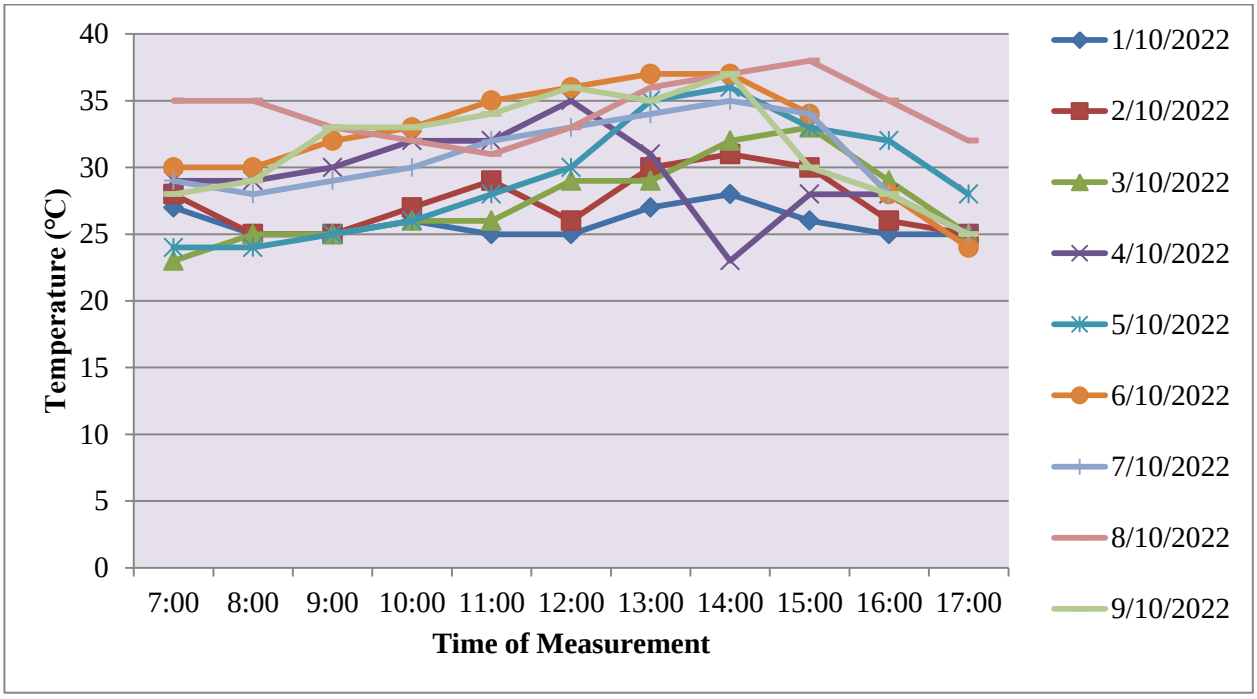
One important factor is temperature to plant the temperate species. According to the literature, most of the fruits and vegetable plants require 15 to 30°C temperature with 50 to 90% relative humidity for optimum growth inside an agricultural greenhouse. The ideal greenhouse temperature for plant growth is between 21 to 27 C or 70 to 80 °F. (https://www.cultivateandequipment.com/blog/ideal-greenhouse-temperature accessed in 19/11/2022).

To control the greenhouse temperature, two window air conditioners with 3 HP was installed to remove excess heat and opened the whole day. The temperature in our greenhouse is above 32 °C so it is too hot to enter inside in the daytime. Project team fined the possible solutions to reduce greenhouse temperature. We did literature review, discussion with experience persons and monitoring daily temperature. Firstly, we use simple cooling method by covering dark-green colored shade-cloth inside the greenhouse maintaining the minimum distance of about 1.5 feet between the shade cloth and roof structure. Before and after shading was recorded daily. The average temperature is 32 °C and the results are shown in the figure (1) and (2).



Average Temperature of this graph is 32**°C**

Figure: 1. Graph of temperature measurement inside the Green House before covering dark-green colored shade-cloth



Average Temperature of above graph is 30℃

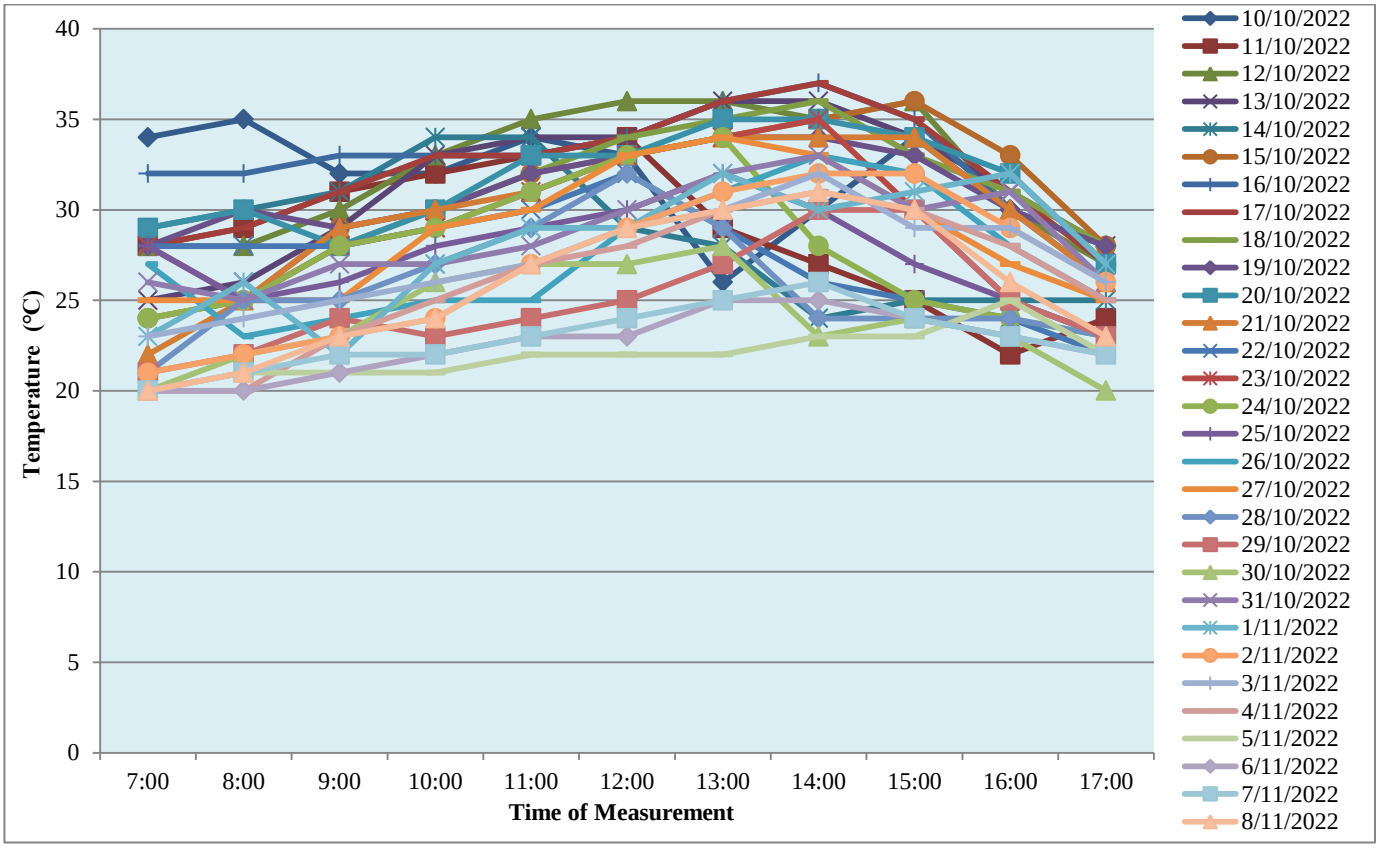
Figure: 2. Graph of temperature measurement inside the Green House after covering dark-green colored shade-cloth

Meanwhile, we create small water fountain to maintain the moisture and to reduce temperature by circulating the water. Also,we plant Giant taro (The Living Rainforest) and Quesnelia sp. (Family Bromeliaceae) which can retain water in the plant. Additionally, we put deciduous trees such as Mastwood *Callophylum inophyllum*, Rose–wood *Delbergia oliveri* and African tulip tree *Spathodea campanulata* with a height of 2.13 m to 2.74 m along the wall of greenhouse. After creating such environment, we re-measured the daily temperature. The average daily temperature decrease from 32 °C to 28 °C and the results are shown in the figure (3). Reducing temperature may also relate to changes of weather conditions from raining season to winter season in Myanmar. Installation of vantilation fan or another alternative way may need to consider in the summer season.

Quesnelia sp.

Small water fountain

Putting deciduous trees along the wall of greenhouse



Average Temperature of above graph is 28℃

Figure: 3. Graph of temperature measurement inside the Green House after covering dark-green colored shade-cloth and put deciduous trees along the wall of greenhouse

Currently, there are 8 Climber species; 20 Native Orchid species; 18 Tree species; 11 Shrubs and 15 Herbs had been planted in the greenhouse.

Planting temperate species in the Green House