

Bikkapathy Mund. Work proposed under the REDAA project.

We discussed three objectives for the work in Bikkapathy Mund, as follows.

1. To understand the pattern of *Cestrum aurantiacum* (hereafter, *Cestrum*) invasion
2. To identify best practices for *Cestrum* removal and restoration of native shola vegetation
3. To set up a 1 ha monitoring plot to serve as a reference for the restoration

Field protocols

1. To understand the pattern of *Cestrum aurantiacum* (hereafter, *Cestrum*) invasion

Cestrum is invading Shola patches in the vicinity of the Bikkapathy Mund settlement. The edges of shola patches seem to have dense *Cestrum*, with the abundance of *Cestrum* declining as one moves from the edge to the interior, though there are some dense patches of *Cestrum* well within shola patches as well, especially near streams. Initial observations also suggest that *Cestrum* is more abundant closer to the settlement (the source of the *Cestrum* in this landscape), just as at a larger scale, it has been demonstrated that sholas closer to tea estates have greater presence and abundance of *Cestrum* than sholas further away.

Given our initial observation of *Cestrum* in this landscape, we are establishing a study to try and understand the potential factors underlying *Cestrum* occurrence — whether proximity to the settlement or proximity to the edges of shola patches, or a combination of the two. Towards this end, we have identified four shola patches, two of which are close to the settlement (distance x-x km) and two of which are further away from the settlement (distance X-X km). In each shola patch, we are laying transects to determine the pattern of *Cestrum* occurrence as one moves from shola edge to interior. The transects closer to the settlement are within 150-350 m distance from the center of the settlement and ones which are farther are at a distance >450 m from the settlement.

Transects will be placed along the side of the shola patch that faces the settlement. Transects will be established radiating into the shola from the edge, and perpendicular to the edge. Given the geometry of the shola patches, it may not be possible for transects to be parallel, but care will be taken to ensure that neighbouring transects are separated by a minimum distance of 50 m at the point where they come closest to each other.

Five 10 x 10 m plots for surveying *Cestrum* presence and abundance (and for recording other factors that could influence *Cestrum* occurrence) will be placed along the transects starting at the forest edge (see Figure 1). The outer side of the first plot will be determined by the woody vegetation that forms the edge of the shola. The distance between plots along the transect will be 10 m for the first three plots, and 20 m for the fourth and fifth plots, for a total transect length of 130 m. (The shape of the shola patches does not allow for longer transects.)

Within each 10 x 10 m plot we will record diameter at breast height (DBH) of all woody individuals (including *Cestrum*) with a $DBH \geq 1$ cm. For multi-stemmed individuals, DBH of all stems will be recorded except stems with a $DBH < 1$ cm and summed later.

Subplots measuring 2 x 2 m will be placed at the corners of the larger 10 x 10 m plots. Subplots will be numbered 1 to 4 going clockwise, starting with the subplot in the left corner of the plot closest to the edge (as one faces the interior of the shola). Within each subplot, we

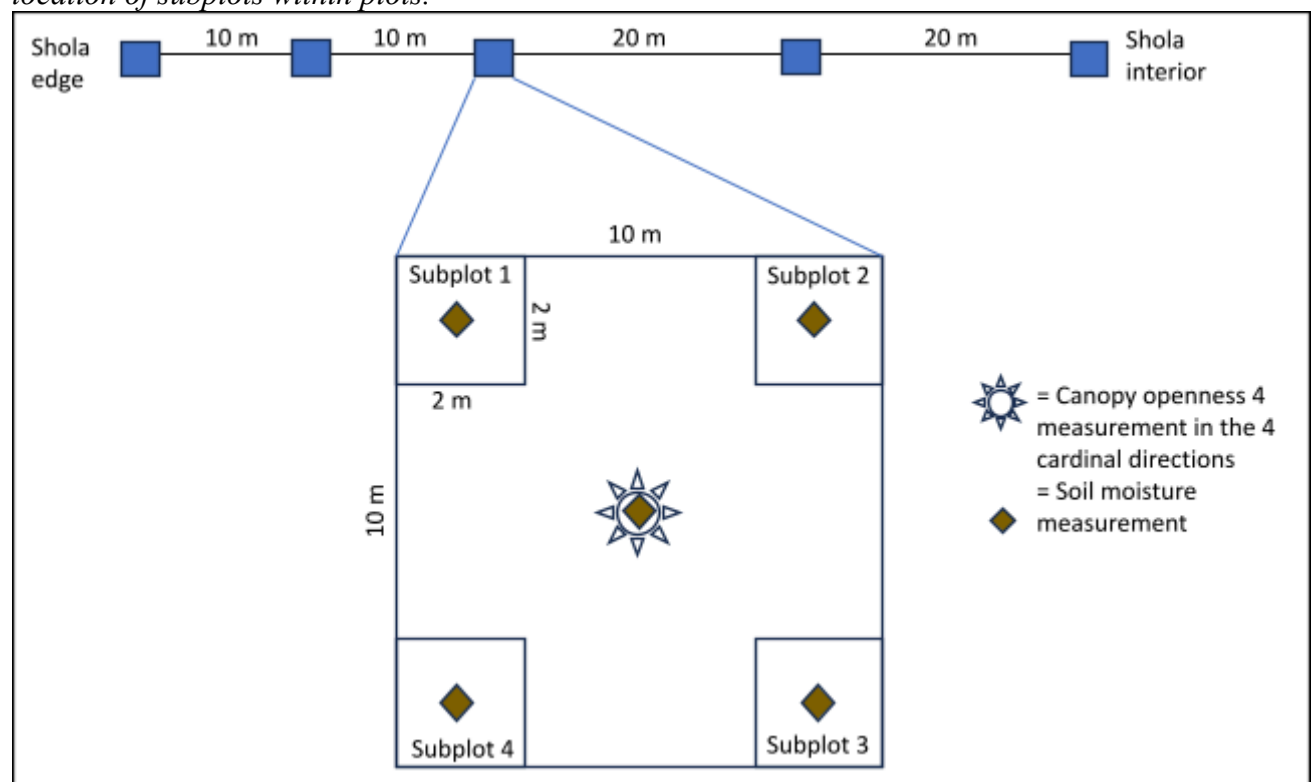
will record numbers of seedlings (non-woody individuals) and saplings (woody individuals shorter than 1.3 m, or taller than 1.3 m, but with DBH < 1 cm). We will also record an ocular estimate of grass cover, and bare ground cover.

We will use a soil moisture probe to record soil moisture at the centre of the 10 x 10 m plot and at the centres of the four subplots. Soil moisture will be recorded as Dry+, Dry-, Normal (Nor), Wet- or Wet+. These readings will later be assigned a score of 1, 2, 3, 4 or 5 respectively to come up with an average soil moisture score or index for the plot.

At the centre of each 10 x 10 m plot, we will record canopy openness with the help of a spherical densiometer (for 4 readings in the 4 cardinal directions). Care must be taken to make sure the densiometer is level. Readings will be recorded as the number of dots that are not covered by the canopy (imagining 4 dots per each of the 24 squares marked on the face of the instrument). These readings will later be multiplied by 1.04 to obtain % canopy openness and averaged to get a single value of canopy openness per plot.

Finally, we will also make a note of any other features worth recording (e.g., dung, signs of lopping, trails passing through the plot or close to the plot, etc.).

Figure 1. Schematic of transect showing arrangement of plots along the transect, and the location of subplots within plots.



Field equipment required:

1. A 40 m rope marked at 10 m intervals (to demarcate the plot). This rope will also have markings at 5 m intervals to enable one to locate the centre of the plot, and at 2 m intervals to enable placement of the subplots. (Markings should use flagging tape of different colours.)
2. 4 sets of 4 m ropes (marked at 2 m) OR 4 sets of PVC pipe 2 m + 2 m with an elbow to demarcate the subplots.
3. A 10 m length of rope, and a 20 m length of rope to help with placement of plots along the transect.
4. 2 sets of DBH tapes and 1.3 m poles

5. Paint to mark woody individuals whose DBH has been measure to prevent duplicate measurements
6. A densiometer to measure canopy openness
7. A soil parameters measuring probe
8. A GPS for using compass to lay plots in a straight transect

2. To identify best practices for *Cestrum* removal and restoration of native shola vegetation

To manage and monitor the spread of *Cestrum* in community lands, two plots have been selected. One near the male cremation ground and another behind the temple near the settlement.

During dry season, the stems of *Cestrum* are cut at 1 foot above ground and the part remaining on ground is slashed and left without uprooting. After onset of rain, when the ground is soft and loose, the part on ground is uprooted with minimum disturbance to the soil.

For monitoring, a 50 x 50m plot is laid in the site near male cremation ground and within this plot at least 20 1 x 1m plots will be placed using quadrats. Inside these quadrats grass cover, bare ground, litter and species present will be recorded **pre and post monsoon**.

In the site behind the temple, since it is a narrow, a 100 x 25m plot is laid and same protocol is followed as done in 50 x 50m plot to do monitoring. As it is a sacred space, only members from the community are allowed to do removal and monitoring.