Appendix 4.11

Project Report

Title: Methods for the Use of Camera Traps and Thread Trails to Monitor Wildlife Use of Crabwood (*Carapa guianensis*) Seeds in the Iwokrama Forest

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Methods for the Use of Camera Traps and Thread Trails to Monitor Wildlife Use of Crabwood (*Carapa guianensis*) Seeds in the Iwokrama Forest

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Iwokrama International Centre for Rainforest Conservation and Development

Introduction

The camera trapping study is a subset of a larger crabwood tree (*Carapa guianensis*) project, the goal of which is to establish a commercial-scale, yet sustainable, harvest of crabwood seeds for the production of crabwood oil. This oil is a valuable non-timber forest product and its production would allow increased revenue to be generated from the Iwokrama Forest. In order to ensure the harvest will be sustainable however, the camera trapping study aims to assess the portion of seeds that must be left in the forest to satisfy both the needs of wildlife and the regeneration needs of the tree species. In order to accomplish this, the study will have three main phases: Phase I- monitoring wildlife visitations with camera traps before, during, and after the dropping of seedpods, Phase II- estimating total seed production of each tree, and Phase III- thread-trailing selected seeds to identify their fate. Upon completing these phases, guidelines can be established as to how many seeds can be harvested and how many should be left behind to ensure that the health of the forest and its wildlife inhabitants are not compromised, such that the production of crabwood oil will, in fact, be sustainable.

Overview of Camera Trapping Study

Three sites in the 360,000 ha Iwokrama Forest (Turtle Mountain, Fair-View Village, and Surama Village) will be selected based on the presence of crabwood trees in relatively high density "reefs". Fifteen trees will be selected and monitored at each site for approximately one year.

Phase I:

For each site, three trees (randomly selected from the original pool of fifteen trees) will be chosen every week to be monitored by a camera trap (one trap per tree). Thus, three camera traps will be in operation per site, requiring nine traps to monitor all three sites. The trees will be monitored in this fashion from February until December during the year 2002, covering the periods before, during and after seed drop, which occurs from April through May (Henriques and de Sousa, 1989).

Phase II:

In addition to camera monitoring, pod pieces on the ground will be counted and marked during the period of fruit production. This is to be done for every tree (fifteen per site) each week. This will allow total fruit production of each tree to be estimated.

Phase III:

For the final phase of this project, threads will be attached to selected seeds, and the seeds then trailed in order to identify their fate. This will aid in the estimation of the portion of seeds required by wildlife for sustenance and by the tree for its regeneration needs.

By knowing how wildlife responds to crabtree seed production (Phase I), how many seeds are produced (Phase II), and what portion of those are predated or dispersed by wildlife, experience mortality, or successfully germinate (Phase III), estimates can be made as to how many seeds should be taken from these areas for a sustainable harvest to take place year after year.

Phase I: Monitoring Sites with Camera Traps:

Selection of Sites

An upland site must be chosen where inundation will not occur during the wet season, as flooded sites could not be monitored. The area must be accessible at all times of the year and should be within a relatively short travel distance from those involved in monitoring the area. It should be easily accessible to these persons (i.e. near a road, trail, etc.) to minimize the time and effort spent on travel to and from the site. The crabwood trees in the selected site must also exist in relatively high densities, such as a reef, to minimize the time spent traveling between trees while checking and moving camera traps.

Tree Selection and Identification

Crabwood trees with a diameter at breast height (dbh) of 35-75cm should be selected, as this size class has been shown to produce the largest seed crop for upland sites (Payne, 2000). Tree diameters are to be measured with a diameter tape at 1.3 m (breast height) above the ground from the uphill side of the tree (Figure 1a). If tree buttresses extend higher than 1.3m, the diameter should be measured 0.1m above the highest buttress (Figure 1b).

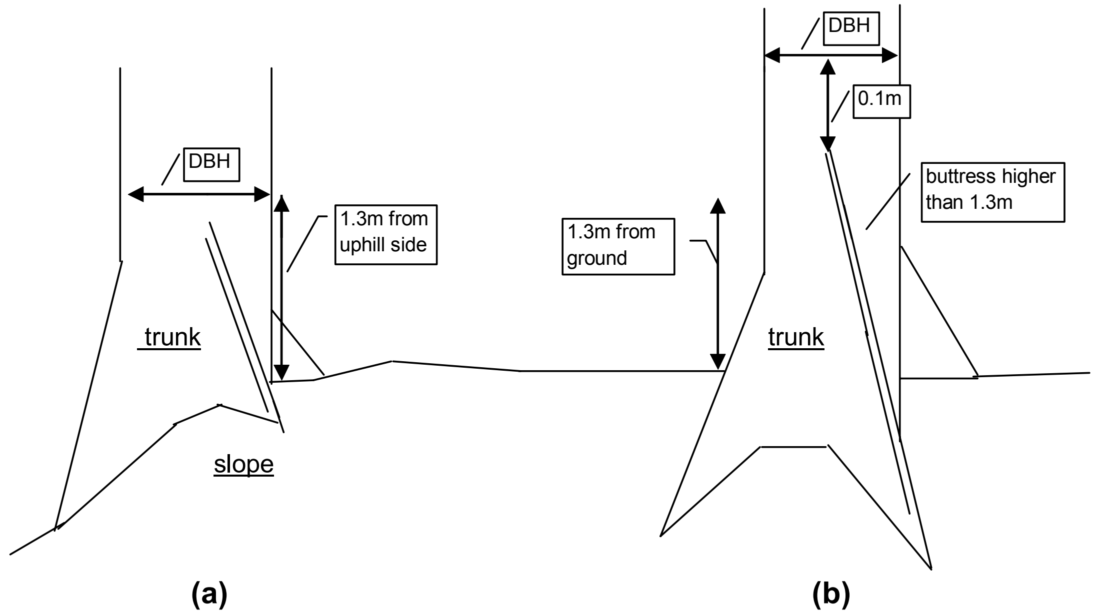


Figure 1. Proper measurements of crabwood DBH based on slope (a) and buttresses higher than 1.3m (b).

Each tree must be given an identification number (ID#), written on both aluminum tags and brightly colored flagging. These should then be fastened on nearby woody vegetation (saplings, lianas, etc.), using soft wire to attach the aluminum tags and tying the flagging next to each tag. This will aid in future location and identification of each tree. The entire crabwood tree itself is not to be flagged so as to minimize any visual disturbances in the vicinity, which could inhibit wildlife from visiting. A handheld Global Positioning System (GPS) can then be used to mark the location of each tree. GPS positions should not be recorded until the EPE reading reads 12m or below, to ensure a reasonably accurate location for each tree. In addition to a GPS location, a compass bearing and approximate distance from each marked tree to the next closest marked tree should be recorded to aid in location of trees during future visits by different persons. These are to be entered in the data sheet as well. If possible, trees should be selected that exist in a long band extending in one general direction, as this will make future location of trees easier and more efficient. This will not only cut down on time required to locate trees, but minimize human scent in the area as well.

Camera Trap Units and Operating Instructions

The camera trapping system consists of three major units: the receiver, the transmitter, and the camera. Each unit must be properly set-up and installed to successfully monitor the site, as described below.

Receiver:

The receiver is the largest of the three units, consisting of a digital readout screen, three programming buttons below the screen, attachment strap, an on/off switch, the camera attachment port, the computer attachment port, an indicator light, and the lens, which receives the infrared beam from the transmitter (Figure 2a). It requires four "C" batteries to function. When batteries are low, a display will appear on the screen that reads "Lo b", indicating they must be replaced (the back panel must be unscrewed to replace batteries and batteries in both the receiver and the transmitter must be replaced at the same time). The receiver is the unit where data is stored regarding the frequency and time of events (an event occurs every time the infrared beam is broken for a set length of time). This unit must be programmed properly to ensure proper monitoring of the sites.

-Time, Year, and Date:

First, the proper time, year, and date must be set. This is accomplished by turning the unit on and pushing the "TIME SET" button. The hours place will begin to blink on the left-hand side of the colon. By pushing the "R/O ADV" button, the hours can be advanced to the proper hour (Note: A 24-hour clock is used, so to set it for 3:00pm, the hours must read 15:00). Once set to the proper hour, push "TIME SET" again and the minutes will begin flashing on the right-hand side of the colon. Again, use the "R/O ADV" button to set the correct minutes. Once the correct time is displayed, push the "TIME SET" button again and the screen will read "Yr _ _", where the first dash will be blinking. Using the "R/O ADV" button, advance to the correct decade ("0"). Push "TIME SET' again and the second dash will begin blinking. Set it for the correct year ("2"). For the year 2002 then, the screen should read "Yr 02". After this is done, pushing the "TIME SET" button again will bring up the date screen. The number before the decimal is the month and the number after the decimal is the day. Use the "TIME SET" and "R/O ADV" buttons to set the correct date. If the date is February 21st, then the screen should read "2.21". Pushing the "TIME SET" button again will bring you to the next screen to set the pulse rate.

-Pulse Rate and Camera Delay:

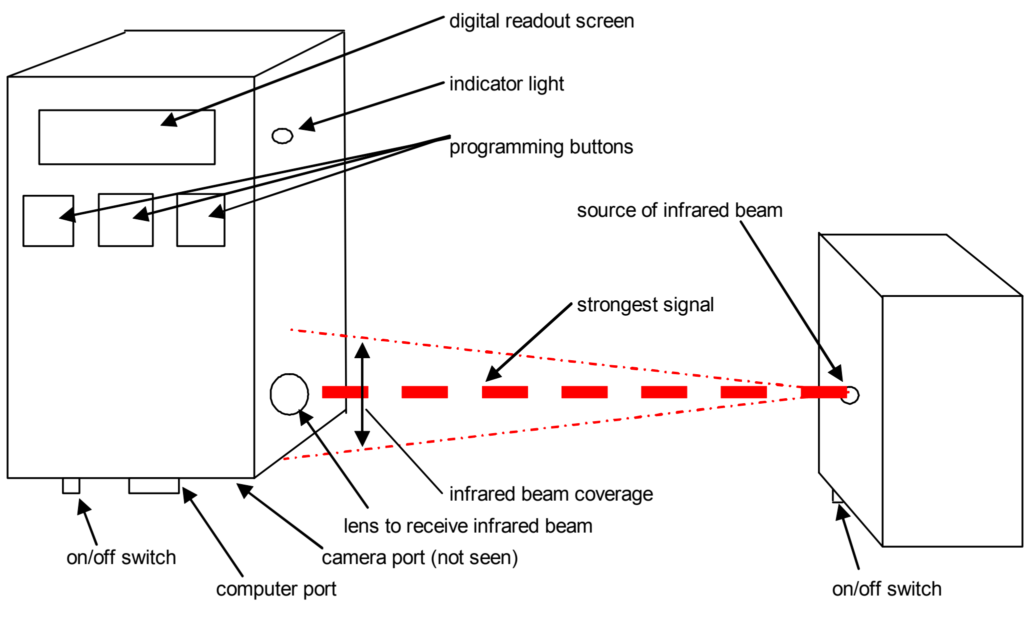
The pulse rate screen will look something like "-P" followed by a flashing number. That number should be set to "5" using the "R/O ADV" button. This means that the transmitted beam must be broken for 5 pulses (1 pulse = .05 seconds) to register as an event. Push "TIME SET" again and a screen will appear that reads "Cd _._". This is the camera delay, which is how much time must pass before the camera will take a consecutive picture. This should be set to "Cd 2.0", which means that 2.0 minutes must pass after the camera takes a picture, before it can take the next picture (although events can still be registered on the receiver). The number before the decimal is minutes and the number after is 0.1 minute. Once the camera delay has been set, pushing the "TIME SET" button will take you out of the setting mode.

-Setting the Monitoring Period for 24 hours:

These camera trapping systems are capable of being set to monitor either 24 hours per day, one period per day, or for two separate periods per day. In this case we want to set it for 24 hours. To do this, press and hold down the "TIME SET" button, and while holding it down, press the “SET UP” button. A screen should appear that looks like “0:1n”. Set this to any number other than “0:00” using the “R/O ADV” button (e.g. “1:00”). This will activate the system to work 24 hours. Use “Time Set” to advance through the other periods (“0:1f”, “0:2n”, “2n:00”, etc.) to be sure they all read “0:00”. Pressing the “SET UP” button will then exit this screen.

-Alignment of Infrared Beam and Activating System

In order to be sure the receiver is properly aligned with the transmitter and receiving the signal, press “SET UP” and the screen should read “S. uP”. Turn on the transmitter (see “Transmitter” below) and point its lens towards the receiving lens on the receiver. The red indicator light should begin blinking if the signal is being received. If not, either the batteries in one of the units need to be replaced or the units are not properly aligned. The transmitter will send out a broad beam of infrared light, rather than a fine beam. The best signal is found at the center of this beam, and by moving the receiver around, the “boundaries”, and thus the center of the beam can be found, which is where the two units should be aligned (Figure 2). This will decrease the chance of the units being knocked out of alignment should they be bumped. Once aligned, and when the screen still reads “S. uP”, pressing “TIME SET” will activate the system. The screen should then read “0”, which is the number of events. Passing an object through the path of the beam should cause the “0” to change to “1”, meaning that one event has occurred. By repeatedly “breaking” the beam, the screen should read “1”, “2”, “3”, and so on.



(a) Receiver Unit **(b) Transmitter Unit**

Figure 2. Diagram showing features of the receiver (a) and the transmitter (b) and proper alignment of the units

-Collecting and Clearing Data from Receiver

The date and time that each event occurred is recorded by the receiver. In order to retrieve this data after each monitoring period, press "R/O ADV". The date will show first, and pressing "R/O ADV" again will cause the event number to show, followed by the time of the event. Record the date and time of each event by advancing through them using the "R/O ADV" button. A decimal will appear both within the event number and the corresponding time to indicate that the camera has been activated to take a picture (e.g. ".21" and "1.1:42" indicates a photo was taken for the 21st event, which occurred at 11:42). Any decimals in the readout should be indicated in the data sheet as they appear in the readout. When all the events have been displayed, the screen will display "thru". Pressing "R/O ADV" again will bring you back to the first event and allow you to go through all the events again. If "SET UP" is pressed two times instead (when the screen reads "thru"), the screen will read "S. uP". Then press "R/O ADV" and the screen will read "clr", which stands for clear. At this point all the events and their data can be erased by pressing "TIME SET". The screen should then read "0", indicating that all events have been erased. (**Important: All data <u>must</u> be written down on the data sheet before clearing the events, as old data can not be retrieved once it has been cleared.)**

Transmitter:

The transmitter is the most basic of the three units. It is the smaller black box consisting of a small lens in the front (which emits the infrared beam), an on/off switch on the bottom, and a strap on the back for its attachment to a post (Figure 2b). This unit requires four "C" batteries to function (again, the back panel must be unscrewed to replace the batteries and batteries in both units must be replaced at the same time). When turned on, a red LED light, located next to the on/off switch, will flash, indicating the batteries are still good and the unit is functioning properly. If the LED light either stays on or does not flash at all, it means that the batteries are too weak and must be replaced. Once the transmitter is turned on, it will emit the infrared beam from the lens, which is then picked up by the receiver. This beam is not visible to the human eye and can only be tested in conjunction with the receiver (see "Alignment of Infrared Beam" above).

Camera:

The camera used in this system is a weatherproof design consisting of a moveable lens, sliding lens cover (which is the on/off switch for the camera), viewfinder, a digital display of the film status (located on the top of the camera), a digital display for the date and time (located under the viewfinder in the back of the camera), and three buttons to set the mode, date, and time (located beneath the date and time display). The correct date and time must be set and synchronized with the receiver unit. This will allow photographs to be properly matched up with the event number and tree that it corresponds with at the site.

-Setting Camera Display:

To synchronize the camera display with that on the receiver, press the "MODE" button until the following display format is shown: "dd ^{M}mm'yy", where "dd" is the day, "mm" is the month, and "yy" is the year. Next, press "SELECT" and "yy" will begin blinking. Set the correct year by pressing the "SET" button, and continue this process to set the month and day. Once set for the correct date, press "MODE" two more times and the day will be displayed followed by the time. Using the "SELECT" and "SET" buttons, set the correct 24-hour time to correspond with the receiver. Leave the camera in that mode, such that the day and time will be printed on each picture when the film is developed. The camera can now be connected to the receiver.

-Connecting the Camera to the Receiver Unit:

A 25-foot cable has been provided to connect the camera to the receiver unit. This is accomplished by inserting the long, narrow end into the camera port on the bottom of the receiver and inserting the 3-pronged end into the camera with the cord facing down. The tripod should then be partially screwed into the base of the camera, leaving enough room for the camera to slide into the metal camera housing. Position the camera in the housing so that its viewfinder is aligned with the square hole in the back of the housing and tighten the tripod. The camera is now ready to be mounted on the wood post (see below).

Set-up of Camera Traps

The transmitter and receiver units should be placed under the main portion of the crabwood tree's canopy when possible. This will increase the likelihood that fruit will fall within the camera's coverage, thus maximizing the number of visits by wildlife to the area being monitored. Wooden posts must be firmly positioned in the ground 2.5m apart. The posts should be cut away from the trees being monitored to reduce disturbance to the area and should be at least 1m in length. This will allow them to be firmly positioned in the ground with ample length above ground to hold the transmitter and receiver units. The post diameter must be approximately 10cm (the width of the transmitter and receiver units) such that one side of each post can be shaved flat to provide a solid backing for each unit to be securely anchored against. The posts should be firmly positioned in the ground and then cut where the transmitter and receiver units will be placed. Once firmly in place, the transmitter and receiver units can be attached, tightly securing the straps (Figure 3a). The units must be positioned such that the infrared beam is approximately 10cm above the ground. Test the units using the "Set-up" button (see "Alignment of Infrared Beam" above) to be sure they will be properly aligned.

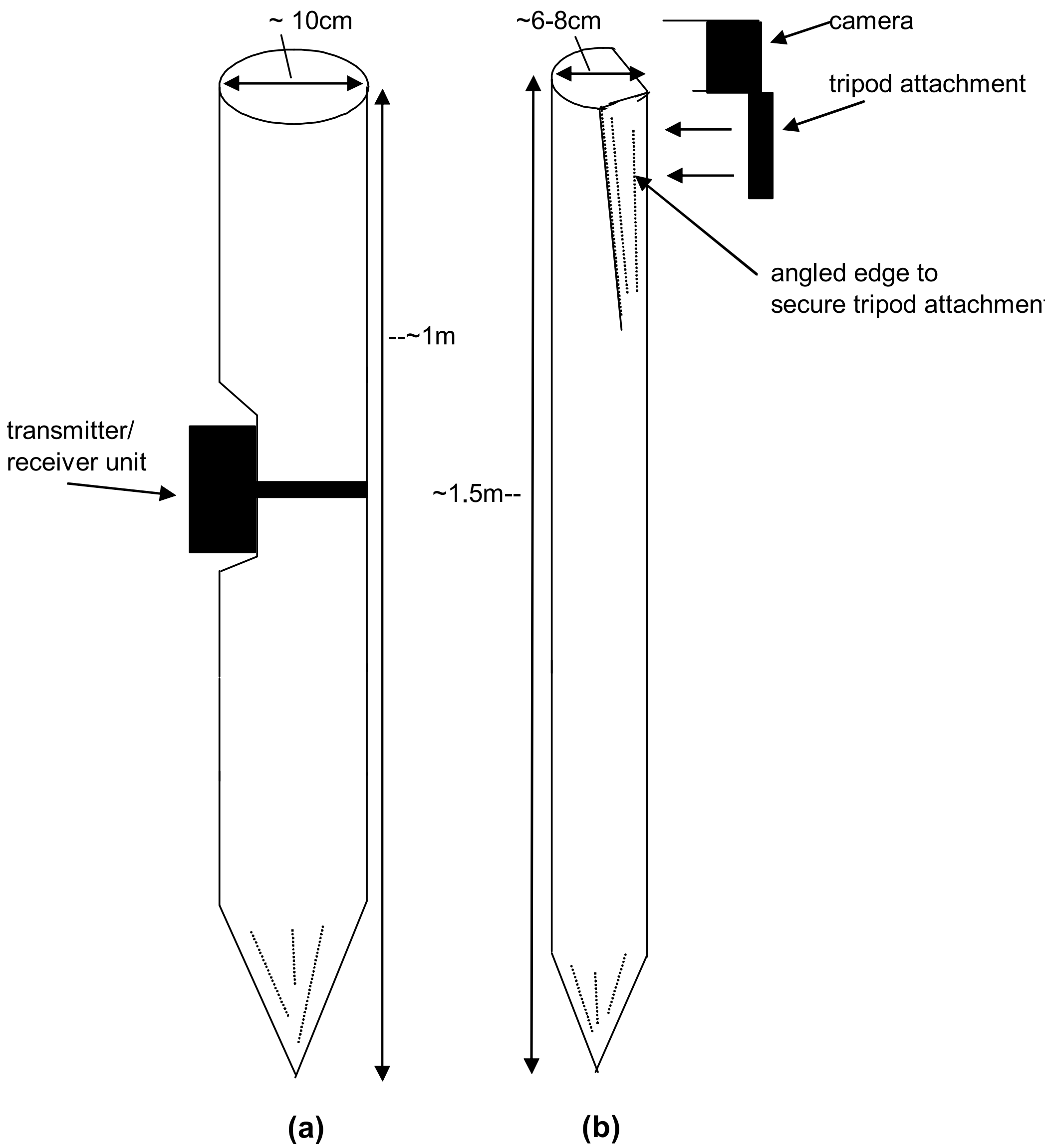


Figure 3. Diagram showing dimensions of posts and attachment positions of transmitter (a) and the camera (b).

Next, the camera must be positioned so as to cover the entire area covered by the infrared beam. A third post must be cut, approximately 1.5m in length by 6-8cm in diameter and firmly positioned in the ground. The top 15cm of the post should be angled to provide a more secure fit for the camera's tripod attachment (Figure 3b). The post should be positioned firmly in the ground slightly out of line with the infrared beam and high enough to allow proper coverage of the area (e.g. ~1.2m). It must be far enough away such that both the receiver and the transmitter are in the frame (Figure 4). When attaching the cord to connect the camera and receiver, be sure the cord is hung over shrubs or small trees, out of the path where animals could pull it out of alignment.

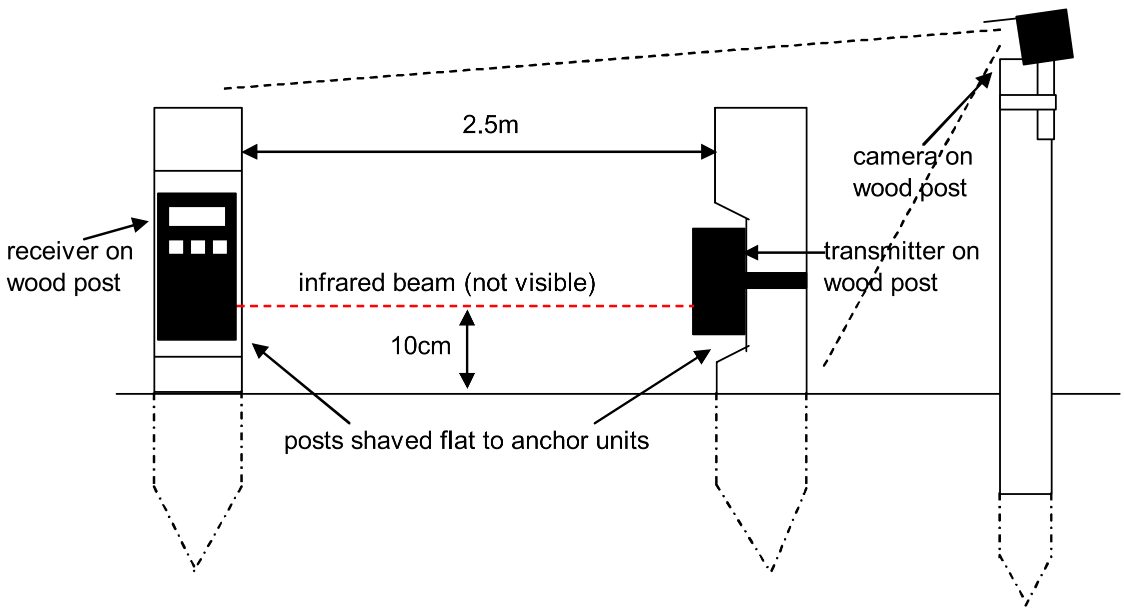


Figure 4. Positioning of receiver, transmitter, and camera. (Note: This should be positioned directly beneath the tree's canopy when possible.)

<u>Data Collection and Site Monitoring</u>

Once the camera trapping units have been properly programmed and positioned beneath the tree's canopy, they can be activated (see "Receiver" above). The time of activation should be recorded and one event should be triggered (with the camera disconnected so as not to waste film) by the operator and recorded to ensure the system is working properly. The camera number and number of pictures (shown in the camera's digital display screen) must also be recorded in the data sheet. This will allow the film to be labelled and referenced back to the correct set of data. When the film is sent to be processed, it must therefore be labelled with the camera number that it was used for.

The system is to be left unvisited then for one week to monitor the tree. After one week's time, return to the site and first disconnect the camera and then one more test event should be recorded by walking throung the beam to ensure the units are still working properly. Once this has been done, record any events on the data sheet provided (being sure to include any decimals), as well as any additional information pertinent to the study (e.g. animal activity, malfunctions, replacement of film or batteries, etc.) in the "Notes" section of the data sheet. Upon recording the date and time of all the events, the receiver can be cleared. The number of pictures that the camera reads on its display should also be entered in the "Notes" section when the camera is checked each week.

The entire system can then be moved to the next randomly selected tree and the process repeated. The receiver, transmitter, and camera posts can be left at the tree, and new ones cut for new trees, or they can be moved along with the units, depending on the decision of those checking the units. If they are moved, flagged sticks should be left in the holes so they can be easily located again. This is to be done every week for three trees at each site. Again, extreme care should be taken to avoid contamination of the area with human scent so as not to alter wildlife behavior.

Data Entry in Computer:

Each week, the data collected from the receiver needs to be transcribed from the data sheets to the Excel file on the 'Cuyuni' computer (login: guest) at the Field Station. The file is located in 'My Documents' in the 'Camera-traps' folder. The file name is 'Crabwood.data.xls'. The data is entered in the same way as it appears on the data sheet, except instead of inserting the decimals as they appeared on the receiver readout, a 'y' for yes or 'n' for no is entered under the column labelled 'Picture'. Each line in the data sheet should then receive some type of mark (e.g. a check or 'x'), indicating that it has been entered. A second copy should be saved on a floppy disk in addition to the copy in 'My Documents'. Also, each data sheet must be saved, as a back-up in the case that the computer file is somehow erased.

Phase II: Counting Seed Pods During Fruit-fall

The second phase of the camera trapping study involves counting the number of pods produced by each tree to assess its fruit production. This will be accomplished by counting and tagging each new pod piece encountered under the tree. Tags will consist of a toothpick with a small piece of flagging attached. This is to then be stuck in the ground next to each pod piece, and that piece then tallied on the data sheet. All fifteen trees at each site must be monitored in this fashion every week until the trees stop dropping fruit. Only pods under the marked tree's canopy should be counted to avoid overestimating fruit production. It is important to wear gloves when marking pod pieces to minimize human scent on the seeds.

Phase III: Thread-trailing Seeds

The final part of this study aims to identify the fate of seeds and quantify the portion of seed production that is eaten or dispersed by wildlife, experiences mortality, or successfully germinates. This will be done for ten seeds per tree at three trees (trees randomly selected out of the original pool of fifteen trees) at each site per week. The trees selected each week, however, should not be the same trees where camera traps are located for that week.

To trail each seed, a 2m length of waxed dental floss will be tied to selected seeds using a large needle to penetrate the seed. The loose end should be attached to a small (~2.5cm) piece of flagging that has been given an individual identification number using a fine-point permanent marker (Figure 5a). The seed and floss will then be left under the canopy and checked during the next visit the following week. The seeds should be arranged in a circle around the tree, the first seed due north of the tree and the rest evenly spaced heading from north to east to south to west. The seeds should be approximately 2m from the base of the tree with the floss pointed towards the tree (Figure 5b). Their approximate location (recorded as a bearing from the tree base) should be recorded in the data sheet. Again, ten seeds per tree will be monitored in this fashion and gloves must be used to process seeds.

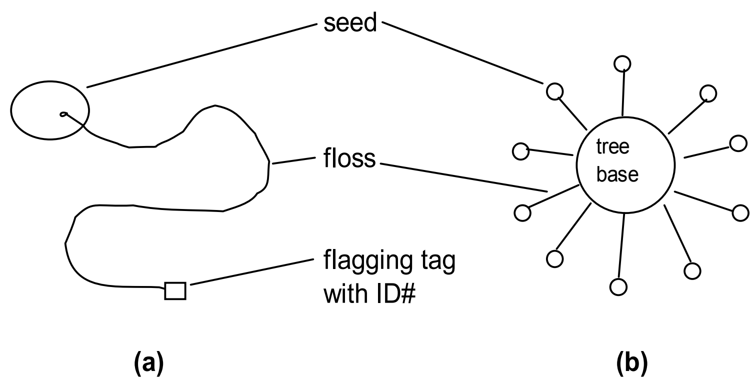


Figure 5. Diagram of flagged seed (a) and flagged seeds positioned around base of tree (b).

Upon returning to check the seeds after one week, the area around the base of the tree within a radius of 10m should be searched. The seed ID# and its fate must be described on the data sheet (e.g. whether the seed and thread disappeared, appear untouched, if the seed was buried nearby, or if the thread is left with no seed attached) as well as the bearing and approximate distance it has been moved, if any. The seeds are to be monitored in this fashion until no seeds remain under the trees to tag.

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Check-list for Camera Traps

-receiver and transmitter are properly aligned (indicator light)

-receiver is set for 24hr mode

-camera time and date match receiver time and date

-one event has been triggered and recorded

-camera is connected to receiver

-camera is set for correct mode (day and time)

-number of pictures on camera and camera number have been recorded

Crabwood Study - Camera Trap Hits Data Sheet

Site ID: Fair View GPS Coordinates: Start- N 04 37' 46.3" W 058 43' 07.4" End- 04 37' 43.6 W 058 43' 11.6"

Camera #	Date (mm/dd)	Tree ID#	Event #	Time (24:00)	Observer	Notes (replacements, problems, tracks, etc.)
	22-Feb	40	1	10:56	Pius/Joel	test; decimal (dec.)
	22-Feb	40	2	10:56	Pius/Joel	test
	22-Feb	40	3	10:58	Pius/Joel	test -dec.
	26-Feb	40	4	04:26	Pius/Joel	dec.
	26-Feb	40	5	17:31	Pius/Joel	dec.
	27-Feb	40	6	03:42	Pius/Joel	dec.
	27-Feb	40	7	06:06	Pius/Joel	dec.
	27-Feb	40	8	11:13	Pius/Joel	dec.
	27-Feb	40	9	13:04	Pius/Joel	dec.
	27-Feb	40	10	14:38	Pius/Joel	dec.
	27-Feb	40	11	15:58	Pius/Joel	dec.
	28-Feb	40	12	14:16	Pius/Joel	dec.
	01-Mar	40	-	10:15	Joel	no signal being transmitted (bat's. good)
6	01-Mar	30	1	10:08	Pius	test;no pictures
6	02-Mar	30	2	20:55	Pius	dec.
6	03-Mar	30	3	03:24	Pius	dec.
6	03-Mar	30	4	03:25	Pius	dec.
6	03-Mar	30	5	04:06	Pius	dec.
6	03-Mar	30	6	14:48	Pius	dec.
6	03-Mar	30	7	20:25	Pius	dec.
6	03-Mar	30	8	21:29	Pius	dec.
6	04-Mar	30	9	14:07	Pius	dec.
6	04-Mar	30	10	19:52	Pius	dec.
6	05-Mar	30	11	19:30	Pius	dec.
6	08-Mar	30	12	09:39	Pius	dec.
6	08-Mar	41	1	10:09	Pius	test; no pictures
6	08-Mar	41	2	10:55	Pius	dec.
6	09-Mar	41	3	13:26	Pius	dec.
6	09-Mar	41	4	13:26	Pius	dec.
6	09-Mar	41	5	13:26	Pius	dec.

6	09-Mar	41	6	13:26	Pius	dec.			
6	10-Mar	41	7	00:48	Pius	dec.			
6	10-Mar	41	8	11:17	Pius	dec.			
6	10-Mar	41	9	19:59	Pius	dec.			
6	10-Mar	41	10	20:59	Pius	dec.			
6	11-Mar	41	11	02:24	Pius	dec.			
6	12-Mar	41	12	01:52	Pius	dec.			
6	13-Mar	41	13	18:41	Pius	dec.			
6	13-Mar	41	14	20:16	Pius	dec.			
6	15-Mar	41	15	11:30	Pius	dec.			
6	15-Mar	41	16	11:31	Pius	test; no dec.			
6	23-Mar	43	1	13:19	Lawrence & Pius	test, dec., no picture			
6	29-Mar	43	2	09:59	Lawrence &Pius	test, dec., no animal tracks			
6	29-Mar		1	11:24	Lawrence&Pius	test, dec., no pictures			
6	06-Apr		2	09:51	Lawrence&Pius	test, dec.			
5	23-Mar	34	1	13:56	Lawrence &Pius	test, dec., no pictures			
5	29-Mar	34	2	09:55	Lawrence &Pius	Test, dec., no animal tracks			
5	29-Mar	36	1	12:01	Lawrence &Pius	test,dec., no picture			
5	30-Mar	36	2	10:45	Lawrence&Pius	dec.			
5	04-Apr	36	3	13:21	Lawrence&Pius	dec.			
5	06-Apr	36	4	13:21	Lawrence&Pius	dec.			
5	06-Apr	36	5	09:36	Lawrence&Pius	dec., test			
6	06-Apr	39	1	10:40	Pius	test, dec., no pictures			
6	13-Apr	39	2	10:43	Pius	test picture taken			
5	06-Apr	31	1	10:08	Pius	test dec., no picture			
5	07-Apr	31	2	06:28	Pius	dec.			
5	08-Apr	31	3	00:19	Pius	dec.			
5	08-Apr	31	4	20:29	Pius	dec.			
5	13-Apr	31	5	10:14	Pius	dec. test			
5	13-Apr	34	1	10:36	Lawrence&Pius	test dec., no picture			
5	14-Apr	34	2	11:02	Lawrence &Pius	dec.			
5	19-Apr	34	3	10:15	Lawrence &Pius	dec. (camera not fxning)			
6	13-Apr	39	1	10:56	Lawrence&Pius	test dec., no picture			
6	20-Apr	39	2	13:52	Lawrence &Pius	test camera noy working.			
6	22-Apr	39	1		Lawrence &Pius	test pic taken, camera noy working upon return.			
5	08-Mar	44	1	10:25	Lawrence &Pius	test, no picture			

5	08-Mar	44	2	10:28	Lawrence & Pius	test, dec.			
5	12-Mar	44	3	20:23	Lawrence & Pius	dec.			
5	13-Mar	44	4	20:15	Lawrence & Pius	dec			
5	13-Mar	44	5	20:16	Lawrence & Pius	dec.			
5	13-Mar	44	6	20:16	Lawrence & Pius	dec.			
5	13-Mar	44	7	12:10	Lawrence & Pius	dec.			
5	13-Mar	44	8	12:10	Lawrence & Pius	test, upon return camera was not working			
6	15-Mar	37	1	12:48	Lawrence & Pius	test, dec.			
6	15-Mar	37	2	12:17	Lawrence&Pius	dec.			
6	15-Mar	37	3	12:21	Lawrence&Pius	dec.			
7	21-Jun	30	1	11:30	Lawrence&Pius	test pic. Taken			
7	21-Jun	30	2	11:31	Lawrence&Pius	dec.			
7	22-Jun	30	3	08:27	Lawrence&Pius	dec.			
7	22-Jun	30	4	08:27	Lawrence&Pius	no dec.			
7	23-Jun	30	5	11:40	Lawrence&Pius	dec.			
7	24-Jun	30	6	06:25	Lawrence&Pius	dec.			
7	25-Jun	30	7	15:30	Lawrence&Pius	dec.			
7	29-Jun	30	8	10:35	Lawrence&Pius	dec. test			
6	21-Jun	31	1	12:03		test pic taken			
6	21-Jun	31	2	12:55		dec.			
6	21-Jun	31	3	12:55		no dec.			
6	21-Jun	31	4	14:24		dec.			
6	21-Jun	31	5	14:26		dec.			
6	23-Jun	31	6	05:47		dec.			
6	23-Jun	31	7	05:48		no dec.			
6	23-Jun	31	8	05:49		no dec.			
6	23-Jun	31	9	05:56		dec.			
6	23-Jun	31	10	05:56		no dec.			
6	23-Jun	31	11	05:56		no dec.			
6	23-Jun	31	12	05:57		no dec.			
6	23-Jun	31	13	05:59		dec.			
6	23-Jun	31	14	05:59		no dec.			
6	23-Jun	31	15	06:00		no dec.			
6	23-Jun	31	16	06:00		no dec.			
6	23-Jun	31	17	06:00		no dec.			
6	23-Jun	31	18	06:00		no dec.			
6	23-Jun	31	19	06:00		no dec.			

6	23-Jun	31	20	06:00		no dec.			
6	23-Jun	31	21	06:00		no dec.			
6	23-Jun	31	22	06:00		no dec.			
6	23-Jun	31	23	06:00		no dec.			
6	23-Jun	31	24	06:00		no dec.			
6	23-Jun	31	25	06:00		no dec.			
6	23-Jun	31	26	06:01		no dec.			
6	23-Jun	31	27	06:01		no dec.			
6	23-Jun	31	28	06:01		no dec.			
6	23-Jun	31	29	06:01		no dec.			
6	23-Jun	31	30	06:01		no dec.			
6	23-Jun	31	31	06:01		no dec.			
6	23-Jun	31	32	06:01		dec.			
6	23-Jun	31	33	06:01		no dec.			
6	23-Jun	31	34	06:01		no dec.			
6	23-Jun	31	62	06:03		dec.			
6	23-Jun	31	65	19:50		dec.			
6	23-Jun	31	86	19:52		dec.			
6	23-Jun	31	111	19:57		dec.			
6	23-Jun	31	123	19:57		dec.			
6	23-Jun	31	149	19:59		dec.			
6	23-Jun	31	173	20:01		dec.			
6	23-Jun	31	179	22:51		dec.			
6	23-Jun	31	180	23:22		dec.			
6	23-Jun	31	181	23:30		dec.			
6	24-Jun	31	182	00:34		dec.			
6	24-Jun	31	184	00:38		dec.			
6	24-Jun	31	185	15:00		dec.			
6	24-Jun	31	186	15:10		dec.			
6	24-Jun	31	187	17:08		dec.			
6	25-Jun	31	189	04:03		dec.			
6	25-Jun	31	190	14:39		dec.			
6	25-Jun	31	202	14:41		dec.			
6	25-Jun	31	207	14:44		dec.			
6	25-Jun	31	210	14:47		dec.			
6	25-Jun	31	216	14:50		dec.			
6	25-Jun	31	218	14:52		dec.			

6	25-Jun	31	220	14:55		dec.
6	25-Jun	31	222	14:57		dec.
6	25-Jun	31	226	21:55		dec.
6	26-Jun	31	227	08:16		dec.
6	26-Jun	31	235	08:18		dec.
6	27-Jun	31	240	13:20		dec.
6	27-Jun	31	241	13:56		dec.
6	27-Jun	31	260	13:58		dec.
6	27-Jun	31	265	01:03		dec.
6	27-Jun	31	267	15:23		dec.
6	27-Jun	31	268	20:16		dec.
6	28-Jun	31				
6	29-Jun	31	359			dec. no pic.

SITE ID: Malali

Camera #	Date (mm/dd)	Tree ID#	Event #	Time (24:00)	Observer	Notes (replacements, problems, tracks, etc.)
	22-Jun				Lawrence and Pius	camera not working on return.
	29-Jun				Lawrence and Pius	test pic taken

SITE ID: Fair View and Malali

Camera #	Date (mm/dd)	Tree ID#	Event #	Time (24:00)	Observer	Notes (replacements, problems, tracks, etc.)
	06-Jul	31	1	11:45		test pic. Taken
	07-Jul	31	2	06:20		dec.
	10-Jul	31	3	01:55		dec.
	10-Jul	31	4	01:56		no dec.
	13-Jul	31	5	10:05		dec.
	29-Jun	30	1	10:50	Lawrence and Pius	test pic. taken
	02-Jul	30	2	07:37	Lawrence and Pius	dec.
	02-Jul	30	3	07:37	Lawrence and Pius	no dec.
	02-Jul	30	4	07:37	Lawrence and Pius	no dec.
	02-Jul	30	5	07:37	Lawrence and Pius	no dec.

	06-Jul	30	6	11:17		dec.			
	06-Jul	30	7	12:17	Lawrence and Pius	no dec.			
	06-Jul	30	8	13:17	Lawrence and Pius	dec.			
	06-Jul	32	1	12:06	Lawrence and Pius	test dec. Pic.			
	08-Jul	32	2	03:43	Lawrence and Pius	dec.			
	08-Jul	32	3	17:44	Lawrence and Pius	dec.			
	08-Jul	32	4	17:44	Lawrence and Pius	no dec.			
	08-Jul	32	5	17:44	Lawrence and Pius	no dec.			
	08-Jul	32	6	17:44	Lawrence and Pius	no dec.			
	11-Jul	32	7	05:06	Lawrence and Pius	dec.			
	22-Jul		1	14:11	Pius	test pic. Taken			
	23-Jul		2	17:11	Pius	dec.			
	23-Jul		3	17:11	Pius	no dec.			
	23-Jul		4	17:11	Pius	no dec.			
	23-Jul		5	17:11	Pius	no dec.			
	23-Jul		6	18:48	Pius	dec.			
	25-Jul		7	09:26	Pius	dec.			
	25-Jul		8	17:13	Pius	dec.			
	25-Jul		9	17:17	Pius	dec.			
	26-Jul		10	08:26		dec.			
	27-Jul		11	13:02		dec.			
	27-Jul		12	21:41		dec.			
	27-Jul		13	21:41		no dec.			
	27-Jul		14	21:41		no dec.			
	27-Jul		15	21:42		no dec.			
	28-Jul		16	00:29		dec.			
	28-Jul		17	01:04		dec.			
	28-Jul		18	01:13		dec.			
	28-Jul		19	01:18		no dec.			
	28-Jul		20	01:24		dec.			
	28-Jul		21	01:24		no dec.			
	28-Jul		22	01:24		no dec.			
	28-Jul		23	01:24		no dec.			
	28-Jul		24	01:24		no dec.			
	28-Jul		25	01:25		no dec.			
	28-Jul		26	01:25		no dec.			
	28-Jul		27	01:25		no dec.			

	28-Jul		28	01:25		no dec.			
	28-Jul		29	01:25		no dec.			
	28-Jul		30	01:25		no dec.			
	28-Jul		31	01:26		dec.			
	28-Jul		32	01:26		no dec.			
	28-Jul		33	01:26		no dec.			
	28-Jul		34	01:26		no dec.			
	28-Jul		35	01:26		no dec.			
	28-Jul		36	01:26		no dec.			
	28-Jul		37	01:26		no dec.			
	28-Jul		38	01:26		no dec.			
	28-Jul		39	01:26		no dec.			
	28-Jul		40	01:27		no dec.			
	28-Jul		41	01:27		no dec.			
	28-Jul		42	01:29		no dec.			
	28-Jul		43	01:29		dec.			
	28-Jul		44	01:29		no dec.			
	29-Jul		45	12:32		dec.			
	29-Jul		46	13:32		no dec.			
	29-Jul		47	15:49		no dec.			
	30-Jul		48	09:14		dec.			