

A Survey of *Ledermanniella yiben* (Podostemaceae) in Selected River Rapids and Waterfalls in Sierra Leone



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(For Comments Before Finalizing)

Introduction

Ledermanniella yiben sp. nov. is a recently described rheophyte belonging to the family Podostemaceae found in a single location in the proposed Yiben dam in the Seli River in northern Sierra Leone. It grows on gneissic rocks in rapids, and becomes exposed in the dry season when the river level drops, behaving like an annual plant. Millions of seeds are released onto the bare rock surface during this period, in readiness for the next rise in water level with the onset of the raining season to commence growth. Most of these seeds will germinate with the onset of rains, where they remain stuck to the rock surface with the aid of a glue-like substance on the surface of the minute seeds.

It is not yet certain why the species is restricted to just a single location in the Seli River, north of the village of Yara, but similar behaviour by members of this family reveal that they have the tendency to be restricted in distribution. This restricted distribution puts the species in a difficult conservation status, making it critically endangered. Dam construction for hydroelectricity across much of the freshwater rivers of Africa has been noted to be a major threat to the long-term survival of Podostemaceae, putting them in danger of extinction. Given the current location of the only population of *Ledermanniella yiben* on the Seli River with potential for impoundment, its long-term survival is not certain if other populations of the species are not located before work commences on the construction of the new dam.

Just under a month ago, efforts were made in transplanting the species from its current and only known location (north of Yara) to other suitable sites in northern Sierra Leone. This work also involved additional searches along the rivers where the transplants were to take place for suitable sites. While the transplantation was accomplished across sites potentially secure from anthropogenic activities, the outcome is yet uncertain, as it is not yet known whether the nearly billions of seeds transplanted at the three new locations will germinate and result in the species re-establishing itself outside of its current known location.

While the search for new populations of *Ledermanniella yiben* was intense, and covered a good portion of the Seli River system where it was first collected, no further populations were located. This search was also extended to the Kaba River in the Outamba-Kilimi National Park in northern Sierra Leone, where it failed to locate the species. It is not clear what the outcomes of the transplantation would reveal after a year or two. If the outcome is not positive and the species to establish itself, then additional and nationwide searches are needed to increase the likelihood of encountering and locating “new populations of the species”.

Aim of the survey

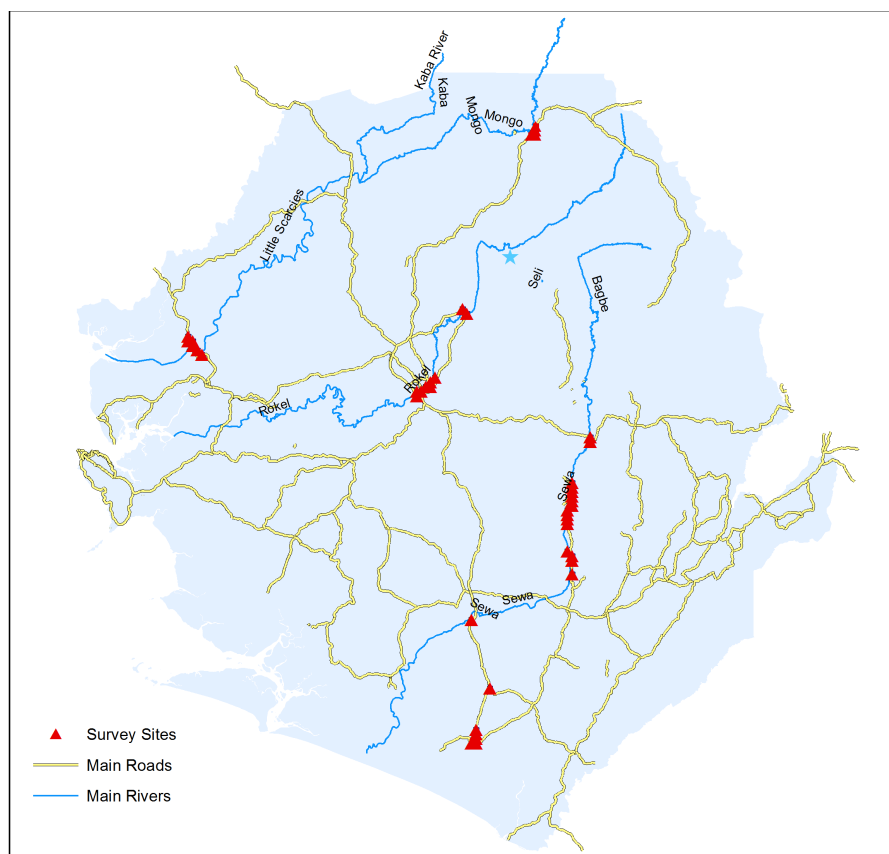
The main thrust of this survey is to search and locate the presence of *Ledermanniella yiben* in other locations in Sierra Leone, including four river systems as well as parts of the Seli River system upstream of where the only known population of the species exists. In accomplishing this, other Podostemaceae present within river rapids and waterfalls were recorded and collected. The main river systems to be searched will include the Little Scarcies and one of its main tributaries (Kaba River), the upper regions of the Sewa River, including the Bagbe River, the Rokel River and River Waanje.

Methodology

Methods of Survey for *Ledermanniella yiben* and other Podostemaceae

The search for *Ledermanniella yiben* and other Podostemaceae was intended to be carried out in 5 river systems, including Seli, Rokel, Little Scarcies, Sewa (and Bagbe tributary) and Waanje rivers (see Figure 1). These searches were based on grid assessment maps provided by “The Biodiversity Consultancy at Cambridge with inputs from the Royal Botanic Gardens, Kew” (see Appendix 1).

Figure 1: Map showing sites proposed for the survey of *Lindermanniella yiben* and other Podostemaceae



The survey for *Ledermanniella yiben* began on April 17, 2017 and ended on May 12, 2017, covering all the 5 river systems indicated above. We had proposed initially to spend a specified number of days within each river system, but given access limitations and rising water levels this was not “strictly adhered to” during the course of the survey, although every effort was made not to change the time duration significantly.

The survey for *Ledermanniella yiben* began on April 17, 2017 and ended on May 12, 2017, covering all the 5 river systems indicated above. We had proposed initially to spend a specified number of days within each river system, but given access limitations and rising water levels this was not “strictly adhered to” during the course of the survey, although every effort was made not to change the time duration significantly. In each river system, searches were conducted by a team of researchers (2-3 persons), and

sometimes assisted by 3-5 local persons (quickly trained by the team leader to spot Podostemaceae). The main rationale behind this training was to aid in broadly spotting as the team spanned across a large area of river in some areas to increase the chances of encounters. The 2km x 2km grid sections of the maps for each river system was utilized in locating the section of rivers to visit.

During each visit, a courtesy call was made on the chief or local authority and purposes of the survey explained to them before requesting for assistance with field assistants. All the local authorities were eager for the work to be conducted in their jurisdiction, and we encountered no restraints on their part to make the survey progress smoothly. We took GPS coordinates of all local communities visited during the survey work. Every morning as the team set out to survey for the plant, GPS coordinates were taken of the starting and end points, as well as points along the river where Podostemaceae were spotted or collected. Where local names of the points along the rivers were known by the local field assistants, we entered those with the corresponding GPS coordinates. In addition, other plant species of conservation significance that the team came across were also noted, taking their coordinates, only on rare occasions collecting herbarium specimens. The team sometimes walked directly to the starting point of the survey along the river and continued walking for hours, breaking to collect specimens or have lunch. Toward the end of the walk, the team either walked back, or chartered a new part to be picked up by a vehicle and taken home. Most field surveys on a daily basis ended between 3-6 PM. Photographs of species, their habitat and rapids were taken in addition to the GPS coordinates and other relevant information. During the search for Podostemaceae, we also took note of sites with potential for transplanting the species from its site at Yara, and examining factors along most river systems where threats might make it unlikely for the species to survive should transplant be initiated.

All specimens of Podostemaceae were collected with associated GPS coordinates and brief field data on their ecology and processed as herbarium specimens. Where possible, duplicates and additional specimens were collected. Copies of all the specimens collected are housed in the National Herbarium at Njala University, with the remaining copies sent to Dr. Martin Cheek (Royal Botanic Gardens, Kew) for identification and naming. The team leader also spent additional time in the National Herbarium of Sierra Leone examining specimens previously collected and archived. This was supplemented by additional searches through grey literature on the Internet for Podostemaceae specifically mentioned for Sierra Leone.

General Limitations

The survey commenced at the time of year when rains had already started falling and anticipated that the levels of water in the rivers might rise before the completion of the survey. This was the case as the survey moved from the Gbondorlor River near Mongo Bendugu to the Bagbe River near Yiffin. In May when the team had moved to the Kono and Kenema districts to survey the Sewa River, water levels had come up, making it treacherous to access most rapids and exposed rocks in the middle of the river. The water level in the Waanje River was even higher by the time we got there to complete the last leg of the survey.

Given that much of this survey was carried out on foot, a longer time period was spent accessing some sites, especially in areas where the terrain was steep and rocks were slippery. In addition, passing through most local communities required that traditional customary greetings and courtesy calls on local chiefs and authorities needed to be concluded first before commencing work.

Findings/Results

The search for *Ledermanniella yiben* in the five river systems failed to locate any presence of it. The search covered the upper reaches of the Seli/Rokel River beyond where the species was first discovered, and where the first transplant experiments were conducted recently. Rapids and waterfalls in other river systems (Mongo, Bagbe and Rokel) within the same watershed were covered during this period, and yielded no signs of the plant. The search which also extended to other river systems (Sewa, Little Scarcies and Waanje) outside of where *Ledermanniella yiben* was discovered, also failed to locate the plant (see Figure 2). The only common species recorded throughout the survey was *Tristicha trifaria*, with occasional recordings of *Ledermanniella aloides*.

To accurately determine whether the specimens collected included any *Ledermanniella yiben*, a total of 27 specimens of Podostemaceae from all the five river systems were sent to Kew (UK) for identification and naming (see Table 1; also Appendix 2 for specimen data sheet). Based on detailed examination of, and comparison of the specimens with the type specimens held at the herbarium at Kew (RGB), none of the specimens matched the type specimens for *Ledermanniella yiben*. According to a report submitted by Dr. Martin Cheek who examined all 27 specimens, while a few of the specimens appeared to resemble *Ledermanniella yiben* superficially, none could be described as it after careful examination under a microscope (see Appendix 3). Based on the survey conducted and that prior to this, it is apt to conclude that the plant remains a single-point endemic, until extensive searches are done in other river systems in Sierra Leone to rule out its occurrence.

Figure 2: Map showing survey sites along rivers for *Ledermanniella yiben* in Sierra Leone

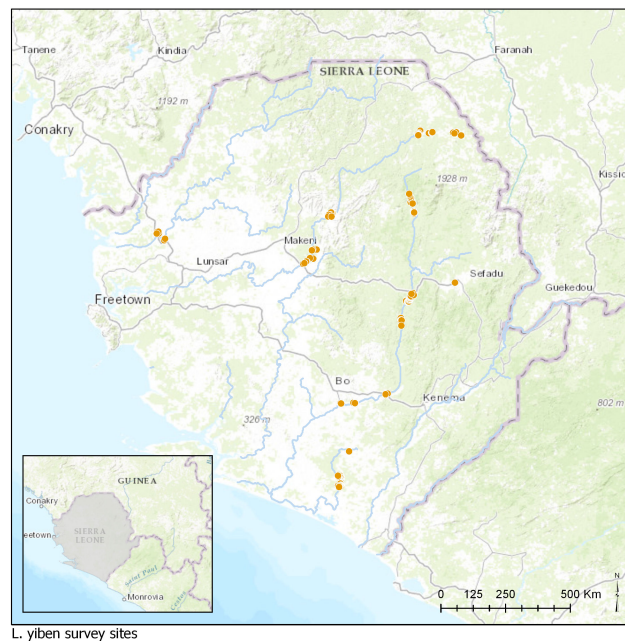


Table 1: List of Podostemaceae specimens sent to Kew (RBG) for Identification & Naming.

Collection #	Family	Species	Collector
Lebbie, A2687	Podostemaceae		Aiah Lebbie
Lebbie, A2688	Podostemaceae		Aiah Lebbie
Lebbie, A2689	Podostemaceae		Aiah Lebbie
Lebbie, A2690	Podostemaceae		Aiah Lebbie
Lebbie, A2691	Podostemaceae		Aiah Lebbie
Lebbie, A2692	Podostemaceae		Aiah Lebbie
Lebbie, A2694	Podostemaceae		Aiah Lebbie
Lebbie, A2695	Podostemaceae		Aiah Lebbie
Lebbie, A2696	Podostemaceae		Aiah Lebbie
Lebbie, A2697	Podostemaceae		Aiah Lebbie
Lebbie, A2698	Podostemaceae		Aiah Lebbie
Lebbie, A2699	Podostemaceae		Aiah Lebbie
Lebbie, A2700	Podostemaceae		Aiah Lebbie
Lebbie, A2702	Podostemaceae		Aiah Lebbie
Lebbie, A2703	Podostemaceae		Aiah Lebbie
Lebbie, A2707	Podostemaceae		Aiah Lebbie
Lebbie, A2708	Podostemaceae		Aiah Lebbie
Lebbie, A2709	Podostemaceae		Aiah Lebbie
Lebbie, A2716	Podostemaceae		Aiah Lebbie
Lebbie, A2721	Podostemaceae		Aiah Lebbie
Lebbie, A2722	Podostemaceae		Aiah Lebbie
Lebbie, A2723	Podostemaceae		Aiah Lebbie
Lebbie, A2724	Podostemaceae		Aiah Lebbie
Lebbie, A2725	Podostemaceae		Aiah Lebbie
Lebbie, A2726	Podostemaceae		Aiah Lebbie
Lebbie, A2727	Podostemaceae		Aiah Lebbie
Lebbie, A2728	Podostemaceae		Aiah Lebbie

One further thrust of the report filed by Dr. Martin Cheek about the specimens he examined, is that several of the specimens were rare collections, with one of them being a new genus, and several additional specimens being new species to science. These discoveries highlight the potential for locating additional new species of Podostemaceae in the country, and might serve to hold hope for locating other new sites for *Ledermanniella yiben* if the search is intensified and carried out in other river systems not previously searched. Given the late start in the survey process leading to a rise in the water level especially for Sewa, Waanje and lower reaches of Seli/Rokel, additional searches in some stretches of these rivers could be conducted at the appropriate time of year (possibly March). When water levels are down and the chances of locating *Ledermanniella yiben* would be increased.

Sites with potential for transplant

Along some of the rivers, sites were identified that could be suitable for possible transplant experiments should future search efforts for *Ledermanniella yiben* fail to locate the plant. Along the Gbondorlor tributary that feeds into the Seli River, a site with a flat igneous rock spread in the river was identified. We also observed *Ledermanniella aloides* and *Tristicha trifaria* growing on the rocks at this site. Another site was also noted in the Little Scarcies with potential for transplant experiments. Two suitable sites were found along the Sewa River (both in the Kono and Kenema districts), but the sites were occupied by two species (Lebbie, A2708 and Lebbie, A27809) which might also be potentially new to science. It is not clear whether these species will coexist with *Ledermanniella yiben* very well, and rather than create detrimental consequences should transplants be carried out there, it is advisable not to utilize such sites at the moment until a full understanding of past transplant experiments are made known.

Threats to Podostemaceae

Sierra Leone's growing demand for energy from Hydroelectricity means that rivers with rapids and waterfalls might end up being severely impacted in the development process. During this survey, mining for gold and diamonds in the Sewa River was the single most important human activity observed that is posing threat to the long-term survival of Podostemaceae in Sierra Leone. A large number of artisanal miners and some heavily mechanized mining activities along the river banks leads to the large scale removal of earth and vegetation, resulting in the deposition of mud over the rocks on which Podostemaceae were found growing. Rock boulders in the river bed, especially in rapids are being moved and or dislocated using a combination of light machinery and brutal force by artisanal miners to remove the diamond and gold bearing gravels for processing. A mixture of sand, small and large pebbles get deposited on flats of rocks as the miners process the gravel, and sometimes get washed and deposited on other rocks bearing Podostemaceae. Areas with such depositions were found to be lacking in Podostemaceae, even though they bore all the characteristics of sites suitable for the growth of Podostemaceae. Given the large number of Podostemaceae that are usually single point endemics, they are likely to be wiped out in the ensuing mining activities, as such unique habitats might be difficult to recreate for the survival of the species.

Training of local guides in locating Podostemaceae

One major outcome of the survey work is the appreciation and knowledge acquired by a group of young men in all the communities bordering the rivers where the surveys were conducted. The limited time available to search large stretches of rivers (including rapids and waterfalls) resulted in some basic training being offered to local field guides recruited from communities to help in locating Podostemaceae under the mentorship of more knowledgeable research assistants. The training involved showing them what was being searched for (especially plants in their reproductive states) using a hand lens. Most of the local guides were initially confused when told that the “white or brown patches” on the rocks were plants. Seeing the capsules and shoots under a magnifying hand lens sparked their interests and methodically went over every rock searching for similar plants or anything resembling what they had seen. In this regard, we were able to cover wide areas and they helped in increasing the number of specimens actually collected during the survey, one of which I must admit is potentially a rare/interesting species.

Figure xx: Local field guides observing Podostemaceae with a hand lens following training activity near Bekongor Waterfall



Conclusion and recommendations

The search for the critically endangered *Ledermanniella yiben* in several river systems in Sierra Leone resulted in no new sites and populations being located for the species. Specimens of other Podostemaceae collected during the survey have been determined not to be *Ledermanniella yiben*, making the species to be a single point endemic. Given that the survey was carried out a time when the rainy season was already underway, some of the rapids were not searched as a result of rising water levels. In the future, it is recommended that such surveys commence at the beginning of March, to increase any chances of locating the plant. Such surveys should be extended to other river systems not included in the current survey, but also to visit sites in the Sewa River where some rare specimens were discovered at a time when the water level was already up. Such a survey might increase the chance of potentially locating *Ledermanniella yiben* if carried out at the right time of year.

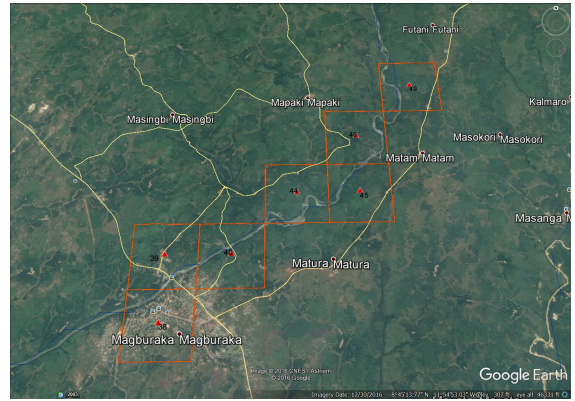
Appendix 1: Maps showing sites identified to visit during fieldwork



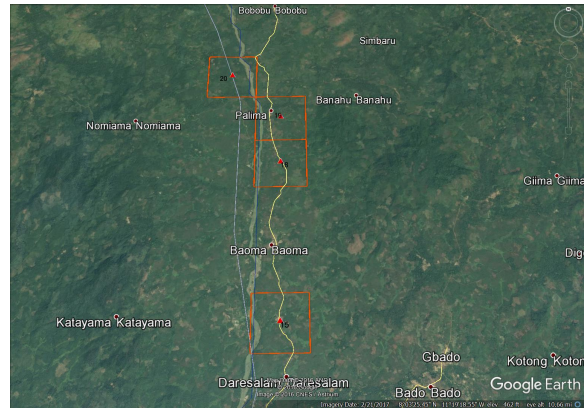
Seli River: Bambuna Area



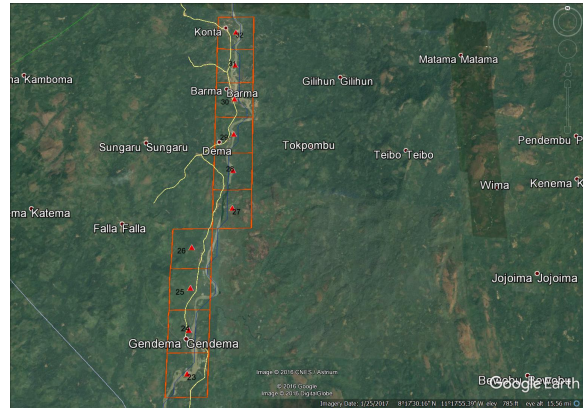
Little Scarcies



Rokel River



Sewa River



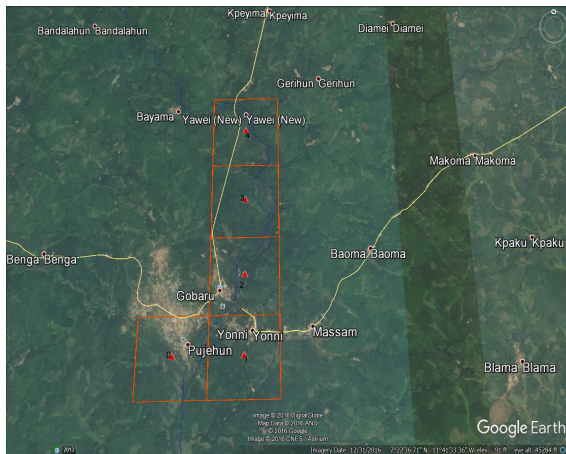
Sewa River (South)



Sewa River



Mongo River



Waanje River

Appendix 2: Specimen Data Sheet

Lebbie, A2687. Podostemaceae. Collected on rocks in the Little Scarcies River, where water levels had already gone down.

Location: Mange Bureh, Port Loko District, Northern Sierra Leone.

Lat: N 08° 55' 38.0" **Long:** W 012° 50' 03.6" **Elevation:** 19m. Time – 09:25:34am.

Date: April 17, 2017.

Lebbie, A2688. Podostemaceae. Collected on rocks in the Little Scarcies River.

Location: Mange Bureh, Port Loko District, Northern Sierra Leone.

Lat: N 08° 55' 37.6" **Long:** W 012° 50' 14.6" **Elevation:** 17m. Time- 10:00:34am.

April 17, 2017.

Lebbie, A2690. Podostemaceae. Specimen collected on rocks in the Little Scarcies River.

Location: Mange Bureh, Port Loko District, Northern Sierra Leone.

Lat: N 08° 55' 26.8" **Long:** W 012° 50' 06.0" **Elevation:** 22m. Time- 12:00:14pm.

April 17, 2017.

Lebbie, A2691. Podostemaceae. Collected on rocks in the Little Scarcies River.

Location: Mange Bureh, Port Loko District, Northern Sierra Leone.

Lat: N 08° 55' 30.9" **Long:** W 012° 50' 12.5" **Elev:** 18m. Time- 1:14:54pm.

April 17, 2017.

Lebbie, A2693. Podostemaceae (*Tristicha* sp.?). Collected on rocks in the Little Scarcies.

Location: Near Bantoro Village, Port Loko District. Sierra Leone.

Lat: N 08° 56' 11.6" **Long:** W 012° 50' 40.9" **Elev:** 21m **Time-** 2:15:28pm

April 19, 2017.

Lebbie, A 2694. Podostemaceae. Collected on rocks in the Little Scarcies River

Location: Near Bantoro village, Port Loko District. Sierra Leone.

Lat: N 08° 56' 12.7" **Long:** W 012° 50' 44.3" **Elev:** 24m **Time-** 2:54:45pm

April 19, 2017.

Lebbie, A2695. Podostemaceae. Collected on rocks in the Little Scarcies River.

Location: Near Bantoro Village, Port Loko District. Sierra Leone.

Lat: N 08° 56' 11.8" **Long:** W 012° 50' 20.0" **Elev:** 20m **Time-** 3:49:47pm

April 19, 2017.

Lebbie, A2696. Podostemaceae. Collected in the Little Scarcies River.

Location: Near Bantoro Village, Port Loko District. Sierra Leone.

Lat: N 08° 55' 29.7" **Long:** W 012° 50' 58.0" **Elev:** 15m **Time-** 5:15:53pm

April 19, 2017.

Lebbie, A2697. Podostemaceae. Collected on rocks in the Rokel River.

Location: Mafiena Village, Magburaka Area, Sierra Leone.

Lat: N 08° 44' 25.5" **Long:** W 011° 55' 54.2" **Elev:** 78m **Time-** 1:48:36pm

April 23, 2017.

Lebbie, A2698. Podostemaceae collected on rocks in the Rokel River.

Location: Mafiena Village, Magburaka Area, Sierra Leone.

Lat: N 08° 44' 21.2" **Long:** W 011° 56' 02.0" **Elev:** 78m **Time-** 2:25:37pm

April 23, 2017.

Lebbie, A2699. Podostemaceae collected on rocks in the Rokel River.

Location: Mafiena Village, Magburaka Area, Sierra Leone.

Lat: N 08° 44' 10.4" **Long:** W 011° 56' 22.1" **Elev:** 79m **Time-** 3:18:48pm

April 23, 2017.

Lebbie, A2700. Podostemaceae collected on rocks in the Rokel River.

Location: Mafiena Village, Magburaka Area, Sierra Leone.

Lat: N 08° 44' 25.4" **Long:** W 011° 55' 53.7" **Elev:** 83m **Time-** 3:49:47pm

April 23, 2017.

Lebbie, A2702. Podostemaceae (Ledermanniella?) collected on exposed rocks in the Gbondorlor River.

Location: Near Kemedu Badala, Gbondorlor River. Koinadugu District. Sierra Leone.

Lat: N 09° 33' 14.0" **Long:** W 011° 08' 16.7" **Elev:** 409m **Time-** 11:16:10am

April 29, 2017.

Lebbie, A2703. Podostemaceae. Collected in Bagbe River on rocks.

Location: Near Kulanya Village, near Yiffin. Koinadugu District. Sierra Leone.

Lat: N 09° 03' 00.8" **Long:** W 011° 15' 00.6" **Elev:** 357m. **Time-** 10:59:39am.

May 1, 2017.

Lebbie, A2706. Podostemaceae (Ledermanniella sp.?) growing on sandstone rocks with mixed black and reddish pebbles.

Location: Underneath the main bridge (River Sewa) at Sewafe, Kono District. Sierra Leone

Lat: N 08° 33' 01.9" **Long:** W 011° 15' 57.1" **Elev:** 270m. **Time-** 10:55:09am.

May 3, 2017.

Lebbie, A2707. Podostemaceae. Appearing as small isolated patches on sandstone rocks in the Sewa River on mixed black and reddish rock.

Location: Near the main bridge at Sewafe, Kono District. Sierra Leone.

Lat: N 08° 33' 01.3" **Long:** W 011° 15' 57.1" **Elev:** 270m. **Time-** 11:23:46am.

May 3, 2017.

Lebbie, A2708. Podostemaceae on a whitish dry thallus covering a flap of rocks near the little waterfall known as Bekongor. Plant material was already dead and dried up with plenty of round/ovoid capsules not yet open, with some stems measuring over 52 cm in length.

Location: Near Fomaya, Little Bekongor Falls. Kenema District. Sierra Leone.

Lat: N 08° 30' 42.0" **Long:** W 011° 16' 53.1" **Elev:** 245m. **Time-** 4:10:17pm.

May 3, 2017.

Lebbie, A2709. Podostemaceae (possibly *Inversodicraea* sp.?) with small scale leaves on the stem and tufted pedicels at the end of the stem. Small plants on rocks near Little Bekongor Falls. (Please note: material might be mixed with some capsules/stems of Lebbie, A2708).

Location: Near Fomaya, Little Bekongor Falls. Kenema District. Sierra Leone.

Lat: N 08° 30' 41.2" **Long:** W 011° 16' 53.6" **Elev:** 243m. **Time-** 3:27:17pm

May 3, 2017.

Lebbie, A2716. Podostemaceae (*Ledermanniella* sp.?). Growing on reddish-brown rock boulder with possibly cotton like fibres or degraded stem material on it and making it appear as if it is part of it.

Location: Approaching Big Bekongor Falls, near Fomaya Village. Kenema District. Sierra Leone.

Lat: N 08° 30' 09.8" **Long:** W 011° 17' 11.1" **Elev:** 165m. **Time-** 1:53:06pm.

May 4, 2017.

Lebbie, A2721. Podostemaceae (*Ledermanniella* sp.?). Growing on rocks amidst grasses. With open capsules and leafy thalli.

Location: Between Fomaya (Kenema District) and Nyanawama (Kono District), on the Sewa River. Sierra Leone.

Lat: N 08° 30' 43.4" **Long:** W 011° 16' 39.5" **Elev:** 257m. **Time-** 3:14:40pm

May 5, 2017.

Lebbie, A2722. Podostemaceae (*Ledermanniella* sp.?). Clustered together on rocks in the Sewa River, with flat capsules, some already open.

Location: Between Fomaya (Kenema District) and Nyanawama (Kono District), on the Sewa River. Sierra Leone.

Lat: N 08° 30' 42.9" **Long:** W 011° 16' 41.2" **Elev:** 256m. **Time-** 3:47:08pm

May 5, 2017.

Lebbie, A2723. Podostemaceae. Collected on rocks growing in the middle of the Sewa River in a small waterfall. Round/ovoid capsules clustering at nodes on the stem and similar to Lebbie, A2708.

Location: At a waterfall called Njaboima, near Nyanawama village in the Kono District. Sierra Leone.

Lat: N 08° 31' 09.7" **Long:** W 011° 16' 26.0" **Elev:** 257m **Time-** 12:07:50pm

May 6, 2017.

Lebbie, A2724. Podostemaceae (*Tristicha* sp.?). Growing on a smooth reddish-black rock with open capsules along the Sewa River banks.

Location: Near Wapiyama and closer to Jormu Village. Kenema District. Sierra Leone.

Lat: N 07° 52' 09.8" **Long:** W 011° 37' 03.8" **Elev:** 83m. **Time-** 4:47:47pm.

May 8, 2017.

Lebbie, A2725. Podostemaceae (*Tristicha* sp.?). Growing on black rock boulders with open capsules attached to short filaments, forming white strips of lines on Sewa River.

Location: Jormu Village, Kenema District. Sierra Leone

Lat: N 07° 52' 09.8" **Long:** W 011° 37' 03.8" **Elev:** 83m. **Time-** 5:07:49pm.

May 8, 2017.

Lebbie, A2726. Podostemaceae (*Tristicha* sp.?). Growing on the sides of a spread of black-rough rocks in the rapids with open capsules in the middle of the Waanje River.

Location: Near Yawei Village, Pujehun District. Sierra Leone.

Lat: N 07° 24' 27.1" **Long:** W 011° 42' 06.7" **Elev:** 25m. **Time-** 10:59:09am.

May 11, 2017.

Lebbie, A2727. Podostemaceae. Growing with open capsules on blackish-rough rocks with other herbaceous plants upstream of River Waanje.

Location: By Bayama, Pujehun District. Sierra Leone.

Lat: N 07° 24' 45.6" **Long:** W 011° 43' 16.5" **Elev:** 38m. **Time-** 4:22:16pm.

May 11, 2017.

Lebbie, A2728. Podostemaceae. Growing on reddish-black spread of rocks in the rapids with open capsules. Stems creeping on the rocks, over 50 cm long, upstream of River Waanje. Capsules closed, but most fallen off.

Location: By Gobaru Town. Pujehun District. Sierra Leone.

Lat: N 07° 22' 03.3" **Long:** W 011° 42' 19.9" **Elev:** 15m. **Time-** 9:51:06am.

May 12, 2017.

Appendix 3: Report to Joule on Identification of Podostemaceae collections made in May 2017 from Sierra Leone by Dr Lebbie

Martin Cheek, RBG, Kew

11 June 2017

Summary. None of the new Lebbie specimens matched *Ledermanniella yiben* which therefore remains known from the single site at risk of being flooded, and therefore of becoming globally extinct if the proposed dam goes ahead. However among the specimens appeared to be several additional new species to science, even a new genus. This highlights how very incompletely known are the Podostemaceae of Sierra Leone, and so reinforces the possibility of additional discoveries being made on further searching, including the possibility of discovering new sites for *L. yiben*.

The object of Dr Lebbie's mission was to search rapids and falls of rivers in order to find additional locations for *Ledermanniella yiben*, currently known from a single site near Yiben on the Seli river where a HE reservoir is planned. Timing was end of dry season, when *L. yiben* is known to be exposed and identifiable.

Results. Dr Lebbie appears to have done a first class job, judging by the large number and high quality of the prepared specimens, and also judging by the good quality of the data recorded for each specimen. In addition, the packing of the specimens was excellent. Specimen purity was high. Very little mixing of species within collections occurred, showing excellent field recognition of species limits. Much of the material was past its peak, and so some was challenging to identify, but this was due to the season, and not any ineptitude by Dr Lebbie. I concluded that Dr Lebbie has learned so well from his Podostemaceae fieldwork with Xander van der Burgt of Kew that he now matches that high standard of work.

It is commendable that Dr Lebbie cast the net wide, and appears to have collected every single Podostemaceae he encountered. This reassures me that his search was comprehensive, and that had *L. yiben* been present at any of the sites which he searched, he would not have overlooked it. Otherwise I would be concerned about the risk of an incorrect search image (easily acquired by even good botanists) resulting in *L. yiben* being passed-over even had it been present

The comprehensive nature of the search is further supported by the fact that Dr Lebbie collected a good number of rather rare species, and altogether an unexpectedly large range of species. In fact it is possible that Dr Lebbie's mission has resulted in the largest single increase in knowledge of this family of plants in Sierra Leone compared with any other mission. So although I have considered SL as comparatively well-known for Podostemaceae at species-presence level, compared with neighbouring countries, it is now clear that it is still very incompletely known.

In fact, the results of Dr Lebbie's work are as good or better than the vast majority of western botanists. I intend to commend Dr Lebbie very highly on his efforts. If this work is to be continued next season as I suggest, then he should be recruited as first choice. This should not be taken lightly, since most alternative botanists would produce inferior results, so every effort should be made to secure his services again in 2018 when the next season comes.

Caveats. In view of lack of available time and the large number of specimens, specimens were not all identified to species, but instead were compared directly with the type material of *L. yiben*, seeking a species-level match. Although several species appeared superficially close to *L. yiben*, scrutiny under the microscope showed that they were not after all very closely similar.

Recommendations. Dr Lebbie should be commissioned to extend his survey to sites additional to those visited in May 2017. Sites could be selected by searching on Google Earth. If the basis for site selection was desktop work by TBC along these lines, then this should be extended.

Timing of the 2018 survey could start earlier in the year, I suggest in March (when we know that it is exposed and identifiable due to the March 2017 survey led by X van der Burgt), as well as April and May.