Darwin Initiative Main Annual Report

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It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)

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Darwin Project Information

Project reference	26-015
Project title	Traditional African vegetables strengthen food and nutrition security in Madagascar
Country/ies	Madagascar
Lead organisation	World Vegetable Center
Partner institution(s)	World Vegetable Center, Centre National de la Recherche Appliquée au Développement Rural (FOFIFA), Université d'Antananarivo (UA), SEMANA
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Project Leader name	Sognigbe N'Danikou
Project website/blog/social media	-
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1. Project summary

Madagascar, a historic cross-road of African and Austroasian settlers, is home to many traditional African vegetables (TAVs), such as African eggplant, African nightshade, and *Vigna* legumes. TAVs have the potential to diversify Malagasy farming systems and therefore secure benefits of biodiversity for the poor. TAVs are nutritious, easy to grow, are often hardy, and well adapted to changing climates. Recognizing this potential, the Darwin Initiative supported the scoping study DARSC182 led by WorldVeg that aimed to understand the diversity of TAVs used by Malagasy farmers; their conservation status and explore opportunities for income and increased consumption. The scoping study resulted in two major findings: i) Malagasy farmers still maintain a high diversity of traditional vegetables but production and consumption of these TAVs are low. Low usage makes traditional vegetables vulnerable to local or national extirpation under pressure of land-use change and crop replacement; ii) A modest investment in seed systems and

increased awareness of benefits for nutrition, income, and climate change adaptation would lead to greater utilization of traditional vegetables. During the scoping study women farmer groups expressed great interest to grow TAVs. This confirms WorldVeg experience in other African countries about the potential of traditional vegetables to empower women in farming businesses. This project aims to secure benefits of agrobiodiversity (ABD) for poor farmer households in two vegetable producing regions: Itasy and Antsirabe (Figure 1). The project is supporting Malagasy women farmers with practise-oriented research to grow traditional vegetables. This will make farming systems more climate-resilient, secure increased income for women farmers, and improve food and nutrition security of Malagasy households. To sustain current and future use of traditional vegetables, the genetic resources of traditional vegetables will be protected *ex-situ* and grown in school gardens together with other food plants to raise awareness about Malagasy food plant diversity.

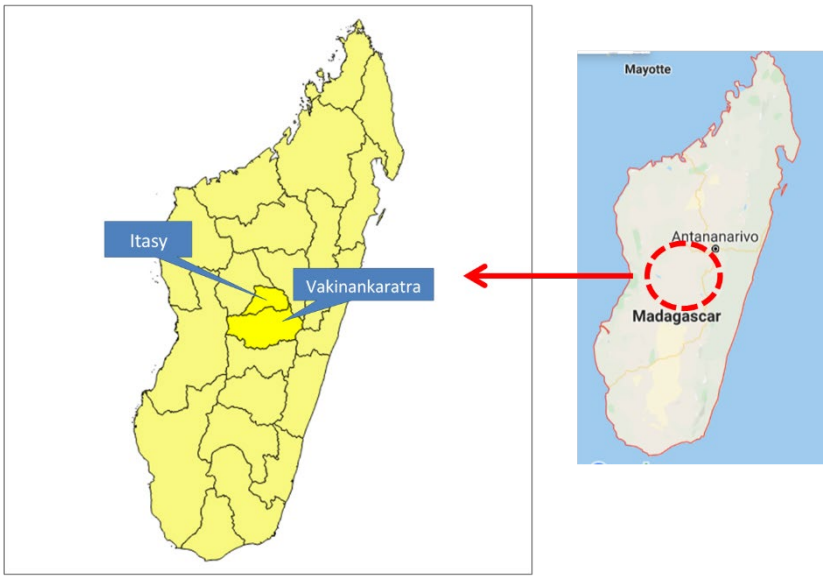

Figure 1. Map of project sites in Itasy and Vakinankaratra (Antsirabe) regions in Madagascar

2. Project partnerships

The partners include the World Vegetable Center, FOFIFA, University of Antananarivo (UA) which are public research and development institutions, and a private partner SEMANA. FOFIFA and UA participated in the scoping study and also have experience with farmer training. SEMANA is a partner of French company Technisem, and produces vegetable seeds for local use and export. The Access to Seeds Index identified SEMANA as the principal seed company in Madagascar for vegetables. During the scoping study women farmers expressed high interest to grow traditional vegetables. Therefore, the partnership was based on a demand stemming from the host country in order to safeguard the genetic resources and to increase production and consumption of TAVs. Through the partnership, awareness was raised among the stakeholders on the importance of TAVs, through the stakeholders' workshop and farmers trainings and capacity building for university students in year 1. The partnership has also gained from the support of the plant genetic resources policy makers (e.g. the focal points of the ITPGRFA and Nagoya Protocol), who are involved with project activities as resource persons. Over the last year new partnerships have been established with CEFFEL a local NGO which manages a training center and specialized in organic farming. The project has partnered with CEFFEL to train the beneficiary women farmers, but also received TAV seeds for testing and for training purposes (see section 3.5. of Appendix 15). A partnership is also established with the local governments in project sites to promote TAVs in their activities (see section 3.5. of Appendix 15).

3. Project progress

3.1 Progress in carrying out project Activities

Output 1: Good understanding of the status of agro-biodiversity in Malagasy food systems.

- Hotspots of traditional vegetable diversity were mapped in year 1 and were reported in the last annual report. The study of the diversity and conservation status of traditional vegetables of Madagascar was part of a continental analysis of patterns of the distribution of 126 selected vegetable crops. This study is published in *Diversity and Distributions* (van Zonneveld et al. 2021). The study showed that at country level, Madagascar has a relatively high richness in domesticated traditional vegetables compared to other countries in Sub-Saharan Africa, but low observed richness of semi-domesticated and wild vegetables. This indicates historic introductions from Africa and Asia resulting in a unique set of local varieties. Hotspots of diversity (blue colour) can be found in the North, South and East of Madagascar (Figure 2). Madagascar also harbours interesting endemic wild relatives of vegetable crops, such as *Vigna keraudnii* a relative to cowpea and three wild relatives of Malabar spinach (*Basella alba*). We found 12 georeferenced historic herbarium records in the Global Biodiversity Information Facility (GBIF) of *V. keraudrenii*. The Google Earth map shows the locations of the records and the main roads in Madagascar. The plan is to re-visit these locations to find this threatened species.

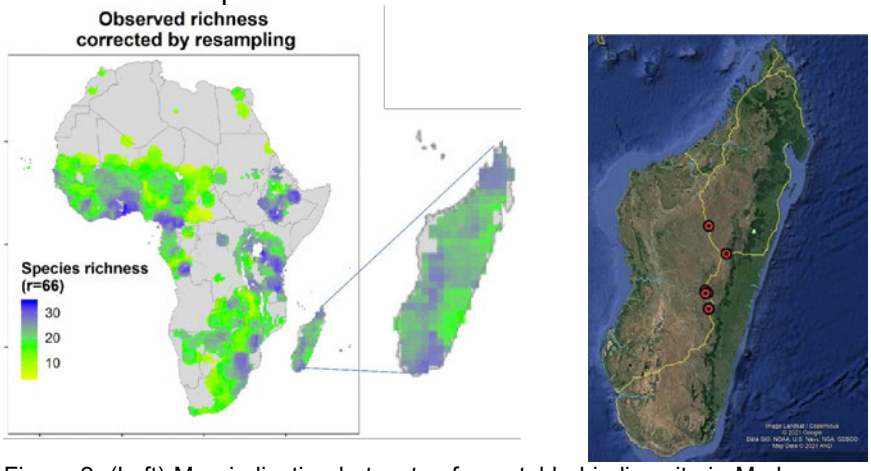

Figure 2. (Left) Map indicating hotspots of vegetable biodiversity in Madagascar. Source: van Zonneveld et al. (2021). Diversity and conservation of traditional African vegetables: priorities for action. (Right) Map of *Vigna keraudrenii* presence records from herbarium in Madagascar.

- Agrobiodiversity (ABD) four-cell assessments were conducted at four new sites (two per region), making a total of eight sites studied in different agroecological zones (AEZs) (see Appendix 16). The ABD assessments were initially planned to take place in at least six communities in different agroecological zones (AEZs). Because of the high diversity of AEZs within each region, project partners have decided to increase to eight communities (Figure 3). Data is compiled and being analysed. Four MSc students working on this task have submitted their theses and will graduate in 2021. The ABD data helped to understand the current use and conservation status of traditional vegetables and other Malagasy food plants. The results were presented at the Power On Your Plate Summit organized by the World Vegetable Center and its partners in January 2021, in Tanzania (Appendices 9 to 12). The data also feed the development of the ABD catalogue. Collected herbarium specimens during the inventories are deposited in the national herbarium of Madagascar, as reference specimens for future studies.

Output 2: Protected and characterized genetic resources of vegetable diversity.

- Collecting of vegetable germplasm has started in year 2 resulting in a collection of in total 611 accessions of TAVs at the project sites. In addition, data was collected on the local name of the collected material, the source of seed, name of the provider, location, geographical coordinate of location, local use, etc. Further collecting will be targeted at crop wild relatives in year 3. All accessions were collected following the national regulations on access and benefit sharing. Collecting permits were obtained and documents stating the prior informed consent were signed. The materials are conserved at the FOFIFA genebank in Madagascar. A discussion is ongoing with the national competent authority to issue an export permit to WorldVeg for germplasm exchange and the importation of the collected germplasm to its genebank in Tanzania (Figure 3, and section 2.1. of Appendix 15).
- Seed multiplication: 250 seed kits (5 crops, 14 varieties, in total 11 kgs seeds) were developed by WorldVeg and sent to FOFIFA in project year 2 for on-station characterization

and seed increase by FOFIFA, and for the on-farm evaluation by the 200 trained beneficiary women farmers. This increases the total number of seed kits sent by WorldVeg to the partners in Madagascar to 500 (21 kgs). The imported WorldVeg seeds were sampled by the national Plant Quarantine Service (SIQV) for laboratory tests, was certified to be free of diseases and an authorization was granted to distribute the seed to the beneficiary farmers (see section 2.2. of Appendix 15).

- Characterization and evaluation of genetic resources of 14 varieties of African vegetables (amaranths, African nightshade, African eggplant, Ethiopian mustard, and pumpkin) is on-going in FOFIFA's research station in Antsirabe (Table 1, and Figures 4 and 5; see also section 2.2. of Appendix 15). This is the second season agro-morphological characterization and seed increase.

Table 1. List of the TAV crops under evaluation by FOFIFA for the second season

No.	Crops	Species	Entry Name	Variety name
V1	African nightshade	*Solanum villosum*	RC 18-ES13-3	Ambureni
V2	African nightshade	*Solanum* scabrum	RC 10-ES13-3	Malala
V3	African nightshade	*Solanum* scabrum	BG 16-Sel	Nduruma
V4	African nightshade	*Solanum* scabrum	SS 49-Sel	Olevolosi
V5	Amaranth	*Amaranth cruentus*	PARIS (A)-Sel	Akeri
V6	Amaranth	*Amaranth hypochondriacus*	AH-TL-Sel	Poli
V7	Amaranth	*Amaranth dubius*	UG- AM -9-ES13-2	Nguruma
V8	Amaranth	*Amaranth cruentus*	Ex Zim -Sel	Madiira 1
V9	Amaranth	*Amaranth cruentus*	AM 38-Sel	Madiira 2
V10	African eggplant	*Solanum aethiopicum*	DB3-Sel	DB3
V11	Ethiopian mustard	*Brassica carinata*	ML EM 1-Sel	Rungwe
V12	Ethiopian mustard	*Brassica carinata*	ST 3-Sel	Arumeru
V13	African eggplant	*Solanum aethiopicum*	OFORIWA'A	Oforiwa'a
V14	Pumpkin	*Cucurbita moschata*	Gkk 174 Sel	Gkk 174
T1	African nightshade	*Solanum sp*	Local landrace	Anamamy
T2	African eggplant	*Solanum sp*	Local landrace	Angivy

Figure 3. (Left) Meeting with the national focal points of the Nagoya Protocol and ITPGRFA, (Right) Germplasm collecting in Madagascar.

Figure 4. Inspection by the Malagasy plant quarantine service of the 14 imported TAV seed kit lines in the nursery .

Figure 5. Traditional African vegetables under evaluation by FOFIFA, in Antsirabe, Madagascar

Output 3: Malagasy extension workers and women farmers trained on seed saving and production of traditional vegetables.

- 25 extension workers (68% women) attended the annual 3-day training-of-trainers course in Itasy and Antsirabe regions (Figure 6, see section 3.1. of Appendix 15). During this training the participants first reviewed the achievements, the challenges and lessons learnt from the first project year. Then, the project staff at FOFIFA trained the extensionists, emphasized the solutions for the identified challenges. Since these trainees were trained before, the roles were reversed this time. They were first asked to conduct the training, the way they have done it with the farmers. Working groups were formed and each of them executed sections of the training program. Then the national project team commented on which aspects of the training went well and the areas and concepts which needed further clarifications. This training was therefore executed in a participatory way and the extension agents learned from each other's experiences and noted areas that need improvement. It also guided the revision of the training manuals based on the feedback from the field. Solutions to the above-mentioned challenges include the development of technical sheets about the control of pests and diseases using natural means, and the implementation of seed and food fairs to promote traditional vegetables at the project sites. The latter will raise awareness of the value of the TAVs and increase demand for these vegetables and their seed. A partnership was established with the *Centre d' Expérimentation et Formation en Fruits et Légumes* (CEFFEL) to train the women farmers in agroecology and soil fertility, pest and disease management using environmentally-friendly techniques. CEFFEL is a local NGO based in the project sites, specialized in agroecology and training of farmers and professionals.

Figure 6. Training of 12 extension workers in Antsirabe (left), and 13 in Itasy region (right)

- 200 small-scale women farmers received one 3-day training in year 2. 200 beneficiary women farmers were trained by the trained 25 extension workers, under the supervision of FOFIFA, on the nutritional benefits of traditional vegetables, how to grow them, and how to produce them and save their seeds. CEFFEL supported the team with training of the women farmers on the production of compost and botanical pesticides following agroecology techniques (Figures 7,8,9, see section 3.2. of Appendix 15).
- 250 seed kits (44g per kit) of 13 improved lines of amaranths, African eggplant, African nightshade and Ethiopian mustard and one promising accession of pumpkin were developed by WorldVeg, imported to Madagascar and distributed to the 200 beneficiary women farmers, school gardens and for on-farm evaluation. The farmers have raised the nurseries and the crops have been transplanted in the field, under the supervision of extension workers and FOFIFA (Figure 8, Appendix 6; section 3.3. of Appendix 15).
- Participatory evaluation by 200 women farmers: the trained women farmers evaluated the varieties that they received. In addition to the WorldVeg varieties, farmers have included their own local landraces for comparisons (Figures 10,11; section 3.3. of Appendix 15). It appeared that Malala and Nduruma nightshade varieties and Madira 1 (amaranth variety) were the most preferred by the beneficiaries for their taste. There was a balanced opinion about the preference for the Ethiopian mustard varieties. While some of the respondents liked them for their taste, others found them less tasty. The introduced African eggplant variety DB3 and the local landraces had not been harvested at the time of the survey in August 2020. However, the M&E in March 2021 indicated that DB3 is among the most preferred TAV varieties evaluated by the farmers.

Figure 7. Distribution of training manuals to women farmers in Ampamelomana (Vakinankaratra) and Soanierana (Itasy)

Figure 8. Training of a group of women farmers (left), and distribution of seed kits after the training (right)

Figure 9. Training of women farmers on agroecology and vegetable seed production at CEFFEL

Figure 10. Beneficiary women farmers receiving the follow up visits and advice of the team (African eggplant left, African nightshade right).

TOP 3 TASTY

	Nb	% obs.
V1	13	7,2%
V2	49	27,1%
V3	49	27,1%
V4	37	20,4%
V5	44	24,3%
V6	37	20,4%
V7	35	19,3%
V8	74	40,9%
V9	23	12,7%
V10	0	0,0%
V11	42	23,2%
V12	49	27,1%
T1	0	0,0%
T2	0	0,0%
Total	181	

TOP 3 LESS TASTY

	Nb	% obs.
V1	29	16,0%
V2	5	2,8%
V3	8	4,4%
V4	9	5,0%
V5	36	19,9%
V6	24	13,3%
V7	17	9,4%
V8	12	6,6%
V9	18	9,9%
V10	2	1,1%
V11	43	23,8%
V12	39	21,5%
T1	0	0,0%
T2	0	0,0%
Total	181	

Figure 11. Participatory evaluation of the TAV varieties by the women farmers. (left) interviews, and (right) the results on most preferred varieties for their taste.

- Monitoring and evaluation. This activity builds on reviewers' comments on the first annual report that the project should develop a coherent and practical monitoring and evaluation plan to collect, analyse and use data, information and insights proactively. An M&E plan was developed to collect data every six months for the project indicators. With the COVID-19 outbrake in Madagascar at the onset of project year 2, we were only able to implement this plan for March 2021. The M&E survey collected data to monitor outcome and output level indicators. It also evaluated vegetable seed production and exchange by the trained farmers to other community members. The results indicated that farmers have increased the diversity of TAV species grown from six to seven vegetable species on average. On average, each of the 200 beneficiary farmers have reached five other farmers (making a total of at least 1,000 new indirect beneficiaries every year), by exchanging seeds and donating fresh vegetables of the varieties promoted by the project. Overall, there is an increase in the production, consumption and sales of TAVs in the project sites (Figure 12, Table 2, Appendix 13). The contribution of home-produced crop to vegetable consumption of participating households has increased from 28.3% to 87.6%. After two cropping seasons, 45% of the households reported that their production meets 100% of their consumption needs. The rest of the farmers (55%) reported an average deficit of 30% of their home consumption needs. Income generation from TAV production has increased in the project site (Appendix 13).

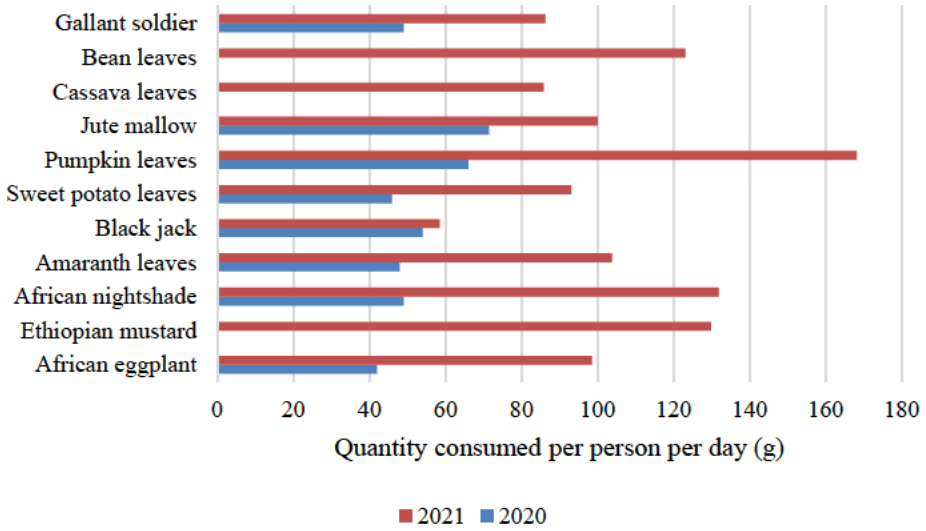

Figure 12. Quantity of TAVs consumed between years 2020 and 2021.

Table 2. Average income (USD) per household from the sale of TAVs. N= 186, 1 USD = 3,755 AR

Indicator/TAV type	2020	2021	Percent change (%)
Total quantity produced (kg)			
African eggplant	31	602	1841
African nightshade	52	41	-21
Amaranth	50	104	107
Sweet potato leaves	30	300	900
Total quantity sold (kg)			
African eggplant	10	34	245
African nightshade	26	27	3
Amaranth	7	17	138
Sweet potato leaves	17	125	635
Total production costs/acre (USD/acre)			
African eggplant	91	1	-99
African nightshade	145	1	-99
Amaranth	83	1	-99
Sweet potato leaves	90	4	-95
Gross margin (USD)			
African eggplant	20	28	42
African nightshade	25	33	34
Amaranth	15	37	150
Sweet potato leaves	13	145	1018

Output 4: Regional school garden programs strengthened to promote conservation and use of agro-biodiversity.

- Focus-group discussions (FGDs) with school children and care takers completed in year 2. In total eight FGDs were carried out at the project sites, with 12 school children per school. The reason why the number of schools was increased was explained in the previous annual report. Two FGDs were conducted in each school, with separate discussions with teachers and the school children. Twelve school children participated in each FGD, which gathered their awareness, knowledge, and perceptions about traditional vegetables. The FGD identified the crop varieties currently grown in the school garden, the seed sources used and the working arrangements with the children. In summary, the schools which have gardens grow mainly exotic vegetable crops (sweet potato leaves, tomato, pepper, common bean, cucumber, lettuce) and some roots and tuber crops (potatoes and yams). The seeds are provided by parents to the children, but sometimes purchased from the market using the income from the sales of produce from the school garden. Only three of the participating schools have had school gardens before. But their experience lasted only one season (see section 4.1 of Appendix 15). Also, only two out of eight schools have canteens, though they do not provide meals every day.
- Biodiversity-rich school gardens established in eight primary schools in year 2. The project team organised trainings for the school children and their caretakers on school gardening and nutrition education, the benefits and nutritional value of vegetables. The partners used the training manuals and videos developed by WorldVeg, which were translated into Malagasy. They were taken through the different steps of vegetable cultivation in a school garden. The harvested vegetable from the garden is cooked and eaten at school (Figure 13).

Figure 13. Activities of the biodiversity-rich school gardens in Antsirabe and Itasy, Madagascar

Output 5: Malagasy women farmers trained on seed production for commercialization.

- The training of 11 progressive women farmers on seed production and commercialization took place in year 2 (Figure 14). It was planned to train 10 women farmers, but the team had to consider one additional woman who strongly expressed her wish to be trained and even proposed to pay for the training if needed. The 11 women farmers received a 3-day training by the private seed company SEMANA and the new partner CEFFEL on seed production and seed business. Topics covered during the training included the seed nomenclature, the art of seed production, post-harvest management of seed including storage, seed quality including aspects related to purity, calibration, etc., seed distribution and marketing, and legal issues with seed business. CEFFEL trained the women farmers on agroecology (see section 5.1 of Appendix 15).

Figure 14: Training of 11 progressive women farmers at SEMANA's seed production site in Anosimboahangy, Madagascar.

3.2 Progress towards project Outputs

Output 1: Good understanding of the status of agrobiodiversity in Malagasy food systems.
Baseline: Limited information on the biodiversity, geographical patterns and the conservation status of traditional vegetables in Madagascar
Change to date: A GIS analysis was conducted which estimated the biodiversity of TAVs in Madagascar at 83 species and identified a collecting gap for 39 species. The ABD four cells analysis is completed in eight sites vs six initially planned. The ABD assessments data collected in year 1 and 2 provide information on the TAV species used by communities, and the levels of threats. This guided the identification of popular promising vegetable species on one hand, and prioritize food plant conservation actions on the other hand.
Source of evidence: refer to Figure 2 in: van Zonneveld et al., 2021, database and field report of the ABD four-cells assessments on TAV biodiversity.

Output 2: Protected and characterized genetic resources of vegetable diversity.
Baseline: There is a gap in the conservation and characterization of traditional vegetable genetic resources.
Change to date: Two germplasm collecting missions were organized in project year 2, and 611 accessions of TAVs were collected. Seeds of 14 WorldVeg varieties of amaranth, African nightshade, African eggplant, Ethiopian mustard and pumpkin have been multiplied and sent to partners in Madagascar for evaluation. These materials have been evaluated for adaptation and their performance compared with popular Malagasy landraces.
Source of evidence: Copy of the authorization to collect granted by the NCA; copy of seed import permits; photos of the trials; photos of the collecting missions; passport data of collected germplasm.

Output 3: Malagasy extension workers and women farmers trained on seed saving and production of traditional vegetables.
Baseline: Lack of technical capacity of Malagasy women farmers in Itasy and Antsirabe regions on seed multiplication and production of African vegetables.
Change to date: Two annual trainings have been organized. The existing WorldVeg seed saving and vegetable production videos and leaflets were translated into Malagasy and used in trainings and also disseminated to farmers. The capacity in quality seed saving and vegetable production of 25 extension workers (68% of women) and 200 beneficiary women farmers were strengthened in year 1 and 2. Five hundred seed kits have been developed and 400 of them were distributed to the 200 women farmers for seed and vegetable production and on-farm evaluation. The other 100 kits were used i) for on-station characterization/evaluation trials, ii) for the establishment of the school gardens, and iii) for distribution to new partners in the project, like CEFFEL. The women trained in home gardening and seed saving have already conducted two cropping seasons and have evaluated 14 promising varieties; plus popular landraces of their choice. It is worth mentioning that the on-farm evaluation was initially planned for year 2, but actually started in year 1.
Source of evidence: Lists of training participants; copies of signed receipts of leaflets by farmers; copy of training report, copy of sales book of farmers, copy of seed import permit; photos of the trials.

Output 4: Regional school garden programs strengthened to promote conservation and use of agro-biodiversity.
Baseline: School children and their caretakers have limited knowledge on the production of TAVs, and there is low biodiversity of TAVs in school gardens in Itasy and Antsirabe regions.
Change to date: A national stakeholder workshop was organized in year 1 to sensitize actors to the potential of TAVs to combat child malnutrition and demonstrating to the young generation ingredients for a healthy diet through school garden programs. Eight FGDs were completed by the end of year 2 to understand the current context of school gardens in terms of the cultivated crops, their use, the sources of seeds, level of involvement of the school children, role of the parents of the school children in the school garden, linkages with school feeding programs if any, knowledge of school children and their caretakers about the value and production of TAVs, and

the willingness of the schools to grow TAVs and to incorporate them in the school feeding programs where they exist. After this situational analysis, school children and their care takers were trained and eight school gardens (initially five planned) have been established in Itasy and Antsirabe regions for strengthening the school garden program. A draft regional agrobiodiversity catalogue is developed and the regional school gardens program workshop is planned for year 3.
Source of evidence: List of selected schools; FGD report; training report; photos of school gardens.

Output 5: Malagasy women farmers trained on seed production for commercialization.
Baseline: Malagasy women farmers are willing to invest in vegetables, but lack technical capacity in seed production and business skills.
Change to date: 200 women farmers received 2-day intense trainings in year 1 and 2, evaluating 14 promising vegetable varieties. Eleven progressive women farmers have been trained by the private seed company SEMANA on commercial vegetable seed production and seed business development in year 2. SEMANA is monitoring the activities of the trained farmers together with FOFIFA and WorldVeg.
Source of evidence: Training report; sales books of trained farmers; photos of seed production plots.

3.3 Progress towards the project Outcome

Baseline: Genetic resources of TAVs are threatened and have very minor contribution to food consumption and income for the smallholder households in the project sites.
Change to date:

- In year 1 and 2, 200 women farmers received two 3-day trainings on seed saving and production of 14 promising TAV varieties. The trained women farmers have grown the varieties in their home gardens and farms. They have consumed the produce in their households. The surplus was sold within and beyond their communities. On average each beneficiary farmer has shared the fresh vegetables and also the seed which they produced with 5 other farmers in the community (see section 3 of Appendix 13). The M&E survey conducted at the end of year 2 indicated that in total these direct beneficiaries have shared vegetables seed with at least 1,000 farmers every season and they are documenting this (200 x 5 = 1,000 farmers each season). The baseline survey revealed that the average household size in the project area is 4.5 persons. Thus, with the 1,000 new households every year the project would have reached 10,800 people with fresh vegetables and seeds [(200 direct households + 1,000 indirect households) X 2 seasons X 4.5 average household size = 10,800 people]. In addition to this, vegetables and seeds are sold to buyers within and outside the communities. The endline survey planned for the last quarter of year 3 will provide further details of how many people have been impacted by the project.
- There is on average a 75% sales increase of the three TAV crops promoted by the project. The highest increase of sales was recorded for amaranth leaves (150%), followed by African eggplant (42%) and African nightshade (34%). With the recent trainings and the linkages with the private partner SEMANA, it is expected that the sales will see further increases in project year 3. The endline survey will provide details of the contribution to the overall household income and household food security.
- From a target of 400 accessions, the project has collected a total of 611 TAV accessions in Madagascar in year 2. The conditions for exporting this germplasm for duplication to the WorldVeg genebank in Tanzania have been discussed with the national focal points of Nagoya Protocol and ITPGRFA, and an export permit has been applied for.
- Eight school gardens have been established, the school children and their caretakers trained and produced vegetables which are being included in school meals. The vegetables are contributing to improve the diets of the children, which are mainly rice-based at the project sites. This is a major achievement, especially with respect to the ongoing COVID-19 pandemic.

Source of evidence: Report of baseline survey; Progress M&E report; Participants list to the trainings on seed saving, and seed business; passport data of collected germplasm.

3.4 Monitoring of assumptions

Assumption 1: The project estimates to indirectly impact 15,000 Malagasy people on the basis of the following assumptions: For each of 1,000 farmers growing traditional vegetables in the Itasy region, at least 3 households with on average 5 household members will increase their consumption of traditional vegetables because of improved access to the vegetables. 3 households x 5 members x 1,000 farmers = 15,000 Malagasy people
Comments: Assumption 1 is reviewed as follows: for each of 200 direct beneficiary farmers, at least 5 new households are reached every year and will increase their consumption of traditional vegetables (200 x 5 = 1,000). So, the 1,000 farmer households refer to the number of farmers who have received seeds from the project. They will in turn share with at least 3 other households.

Assumption 2: Communities can be accessed for, and are willing to participate in the agro-biodiversity four-cell assessments.
Comments: Assumption 2 held true. Communities were accessible to conduct baseline socio-economic surveys, ABD four-cell assessments and training of the extension workers and farmers. Although the situation has evolved with the COVID-19 pandemic the project activities have not been negatively impacted. The main reason is that the main implementing national partner, FOFIFA, is based at one of the project sites outside the capital city Antananarivo and could continue to operate, while Antananarivo itself has undergone several lockdowns.

Assumption 3: FOFIFA will obtain permits with the corresponding national authorities in consultation with the ITPGRFA focal point to collect and ship seeds to the WorldVeg genebank of traditional African vegetables in Arusha, Tanzania.
Comments: Assumption 3 holds true and the permit to collect was issued and the germplasm was collected. The project team is discussing the export permit with the national competent authority.

Assumption 4: Communities can be accessed by extension workers and MSc students to support capacity development of women farmers and to support school gardens and other agro-biodiversity activities in primary schools.
Comments: Refer to the comments above on Assumption 2.

Assumption 5: School directors give permission to establish school gardens. School directors and caretakers give permission to interview school children. Students and teachers maintain school gardens.
Comments: The assumption holds true. From 5 initially, the project has established 8 school gardens and many other schools are requesting the project to help them to have their own school gardens.

Assumption 6: Progressive women farmers are interested to develop seed businesses.
Comments: The Assumption 6 holds true. From 10 initially planned, the project has enrolled 11 progressive women farmers.

3.5 Impact: achievement of positive impact on biodiversity and poverty alleviation

The project has collected 611 accessions of TAVs, including rare landraces. These materials are conserved in the genebank at FOFIFA and will be exchanged in year 3 for conservation and duplication in the WorldVeg genebank in Tanzania. The 200 trained beneficiary women farmers are growing 14 promising varieties of African vegetables which they are consuming in their household and selling to other community members and beyond. The trained farmers recognize the value and the potential of TAVs. They spread this information to more farmers. Increased use of TAVs strengthens their conservation. Biodiversity-rich school gardens have been established and school children are eating healthy foods at school. All these results contribute to improving household nutrition, child welfare, poverty alleviation, and biodiversity conservation.

4. Contribution to the Global Goals for Sustainable Development (SDGs)

The project is helping Madagascar to deliver on the SDGs on “No poverty” (1); “Zero hunger” (2); and “Climate action” (13), and “Life on land” (15).

SDG 1 on “No poverty”: Itasy and Antsirabe are the most populated regions of Madagascar, and the baseline indicated that smallholders live on less than $2.00 a day. The project has trained 200 smallholder women farmers, provided them seeds and extension on the production of traditional African vegetables. They are selling seeds and vegetables and the income they generate from the selling of TAVs has increased by 75. The training on seed business is opening up new opportunities to the beneficiaries to earn additional income.

SDG 2 on “Zero hunger”: The trained 200 farmers have established their vegetable gardens which include a diversity of nutritious traditional African vegetables. With the seed kits provided by the project, the trained beneficiary farmers have grown more vegetables and have additional nutritious food to eat and diversify their diet. The school gardens also provide an opportunity for school children to eat more healthy at school. These will contribute to reducing micronutrient malnourishment, especially between November to March, which coincides with the lean season at the project sites.

SDG 13 on “Climate action”: The project introduced 14 promising varieties of amaranth, African eggplant, African nightshade, Ethiopian mustard and pumpkin to the production systems in the Itasy and Antsirabe regions. This provides options for farmers to diversify their farming systems, dominated by rice production. Vegetables are hardy and short cycle crops and are well fitted in a rice-vegetable rotation. On-farm diversification with traditional African vegetables is thus a promising adaptation strategy to manage risks under climate change while sustaining income.

SDG 15 on “Life on land”: The project has contributed to biodiversity conservation by collecting 611 TAV accessions, including unique landraces, currently conserved in FOFIFA genebank in Madagascar. The project has donated about 13,000 aluminium foil bags for packing and storage of germplasm at the national genebank (Appendix 8). The project also distributed WorldVeg-developed vegetable germplasm from its genebank in Tanzania to farmers for direct cultivation. Through these actions, the project contributes to the conservation and sustainable use of biodiversity in Madagascar. It also promotes at the same time the fair and equitable sharing of the benefits arising from the utilization of genetic resources and promotes appropriate access to such resources, as internationally agreed. This is evidenced by the cooperation with the national ABS stakeholders for the exchange of germplasm between Madagascar and WorldVeg.

5. Project support to the Conventions, Treaties or Agreements

International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA): By distributing 500 seed kits of 14 vegetable varieties bred by the World Vegetable Center (using material transfer agreement) to FOFIFA and to 200 farmers in Madagascar in year 1 and 2 for evaluation and direct use by farmers, the project is contributing to Article 7 on national commitments and international cooperation, and to Article 10 of the ITPGRFA on the Multilateral System of Access and Benefit Sharing.

Convention on Biological Diversity (CBD): A GIS analysis in year 1 identified a collection gap for 39 species, and three African vegetable biodiversity hotspots in Madagascar. The Malagasy Ministry of Environment, through the Directorate of Renewable Natural Resources and Ecosystems issued collecting permits which allowed the collection of 611 TAV accessions for ex-situ conservation. This undertaking contributes to the Articles 9 and 10 of the CBD. By organizing ABD assessments in eight communities in different agroecological zones to identify the threatened TAVs for conservation, the project is contributing Article 13 of the CBD.

Nagoya Protocol on Access and Benefit Sharing (ABS): Prior informed consent (PIC) was obtained from local communities before conducting the ABD assessments and the baseline

household survey on the current status and utilization of the TAVs. PIC was also obtained before collecting vegetable landraces from farmer communities. The permit to collect TAV germplasm issued by the Malagasy NCA contributes to the implementation of the policy framework that was supported by the successful Darwin Initiative project titled “Mutually supportive implementation of the Nagoya Protocol and Plant Treaty”, ref 22017. The permit provides that collectors obtain prior informed consent and negotiate mutually agreed terms with local and national authorities.

6. Project support to poverty alleviation

As stated under Section 4 above, there has been a 75% increase in the sale of the traditional vegetables promoted by the project in Madagascar. With the awareness campaigns and trainings for the women farmers, it is expected that the sales will rise beyond 100% by the end of the project. This is contributing to poverty alleviation of resource-poor female farmers. The trained progressive women farmers in business development will seize market opportunities in their regions and in Antananarivo to increase and stabilize their income from the sales of African vegetables and seeds. The M&E conducted at the end of year 2 provides evidence of positive progress, as compared with the household baseline data collected in year 1.

7. Consideration of gender equality issues

The baseline surveys in year 1 indicated that in more than 70% of households, women are the ones who make decisions about the choice and consumption of vegetables while men decide on staple and other commercial crops. This confirmed the results of the scoping study prior to the project and also justifies the importance of strengthening smallholder women’s capacities on the production of African vegetables. By targeting the women farmers, the project builds gender equality by providing new income opportunities for the women while strengthening food and nutrition security in their households.

8. Monitoring and evaluation

The project Steering Committee comprising project focal persons at the World Vegetable Center, FOFIFA, University of Antananarivo, and SEMANA monitors and evaluates progress of the project activities and deliverables, and takes important decisions about how to address the challenges as they arise during implementation. The project Steering Committee meets periodically to monitor progress. Ad-hoc meetings were also organized to discuss and take decisions regarding some challenges needing urgent action. An Experts Guidance Group has also been created and includes, in addition to the Steering Committee members, WorldVeg’s agrobiodiversity expert, TAV breeder and impact evaluation expert, and the national focal points of ITPGRFA and the Nagoya Protocol as resources persons. The Experts Guidance Group gives technical backstopping to the project steering committee. A total of four online and two face to face meetings were organized by the Steering Committee during year 2. The M&E plan was revised during the project year 2 and tools were developed to systematically collect data on the indicators. M&E data was collected among the women farmers on the contribution of the project to household consumption of vegetables, the changes in vegetable sales, how many other community members have they shared vegetable seeds with, the current status of vegetable production in school gardens, their contribution to school feeding, and attitude of the children regarding nutrition, taste and consumption of the TAVs. The M&E also documented the progress with germplasm collection and conservation.

9. Lessons learnt

The last period has been challenging with the COVID-19 pandemic, which has impacted international travels. However, the project team made suitable arrangements in order to continue with the implementation of project activities, including increased online meetings, distance trainings and the use of app-based survey tools to collect M&E data. Thus, all the planned

activities for year 2 were successfully implemented thanks to the good working relationship with the national project partners.

The development of new partnerships with the local government (Mayor of Arivomamo II), and local NGOs (CEFFEL) has raised the project profile in the region and at national scale. These partnerships will be strengthened to increase awareness of the nutritional potential of the TAVs in Madagascar.

The involvement of national focal points of the ITPGRFA and the Nagoya Protocol as resource persons in the Expert Guidance Group was essential for the project progress. The focal points understand better the project activities and expected impact. This has facilitated communications with the national competent authority for access to collect the germplasm of TAVs.

10. Actions taken in response to previous reviews (if applicable)

Comments from previous review and the actions taken

Comment 1: Review the Outcome target of the project (of 15,000 beneficiaries), the assumption (Assumption 1) underpinning this and associated indicators (0.1-0.5 inclusive). Review the calculation used to come to this 15,000 number, ensure that clear data is collected specifically against these indicators, in order to both track progress, and test the assumption, not conflating this with Output level data.

Action taken: The 1,000 farmers in the above refer to the number of farmers who have received seeds from the project, including those receiving seeds from the direct beneficiary farmers. They will in turn share with at least 3 other households. M&E tools have been developed to systematically collect data against the associated indicators. The results of this M&E are reported in the current annual report.

Comment 2: Develop a coherent and practical monitoring and evaluation plan – in line with the project logframe – to collect, analyse and use data, information and insights proactively. This should be for both accountability purposes (such as for periodic reports such as this, ensuring that all logframe indicators are having data collected against them), and learning purposes (to adapt and evolve the programme as it continues its progress).

Action taken: M&E tools have been developed and data is systematically collected against the above indicators.

11. Other comments on progress not covered elsewhere

In the last year of the project, further communications and dissemination will target policy makers, building on the key results from the project implementation.

12. Sustainability and legacy

Twenty-five extension workers and 200 women farmers have been trained and have become experts in TAV production and seed multiplication. The farmers are selling the seeds of TAVs and some extension workers are also growing the vegetables. In year 2 the project organized exhibitions in the project site and engaged with national media to showcase the project activities and results (follow this link, and watch the TV program from 35:46 to 37:40). TAV seed and biodiversity fairs were organized (Figures 15 and 16). The project has partnered with local government and NGOs to support the scaling of project products, e.g. visibility for TAV seeds and school garden programs. CEFFEL has received seeds and has included TAVs in its portfolio to train more farmers and interns from agricultural schools. In total 7 MSc students have been involved with project activities by end of year 2, and four of them were trained on the four-cell methodology to assess ABD, two were trained on socioeconomic research, one on vegetable germplasm characterization and one on school garden interventions. The project was also publicized outside Madagascar and experiences were shared in other meetings, e.g. participation in the Power On Your Plate conference, 25-28 January 2021 where four project team members presented results from the project. See Table 2 of Annex 3 for further details on the publications.

The planned exit strategy remains unchanged.

Figure 15: Official ceremony of the presentation of the traditional vegetable seeds produced by the project beneficiaries at the town hall of the Municipality of Arivonimamo II with the Mayor

Figure 16: Exhibition of TAVs in project sites in Madagascar

13. Darwin identity

The project uses the Darwin Initiative logo on all training and communication materials developed by the project (e.g. the training leaflets, project posters and banners, T-shirts, etc.). Promotion of project activities were done through web articles, blogs and tweets with hashtag to the Darwin Initiative. The project has further gained visibility with the seed and biodiversity fairs organized in project sites, and with the participation in the TAV Power On Your Plate conference. The new partnerships with local governments and NGOs, and the celebration of the international women's day on 8 March in Antsirabe have also increased the visibility of the Darwin Initiative (find here and here stories published about the project; see also section 3.5 of Appendix 15). A video about the project prepared by FOFIFA in Malagasy is available here.

14. Impact of COVID-19 on project delivery

The outbreak of the COVID-19 in Madagascar coincided with the start of project year 2. Antananarivo was put on lockdown followed by the restrictions on international travels. This caused a postponement of the activities requiring mass group gatherings (training of large groups of farmers, and school children). But the team was able to catch up as soon as the measures were softened by the government. One important element allowing to mitigate delays due to the pandemic was the closeness of FOFIFA staff to the project sites. The project team also made use of information and communication technologies, by organizing online trainings and by using mobile-based data collection tools. The project team members and participants were always reminded to follow the safety measures as directed by the national authorities. Based on the implementation strategy put in place to cope with the pandemic, it was expected that COVID-19 has only a limited impact on the project. However, with the second wave of COVID-19, further

restrictions have been put in place by the Malagasy government, including the closure of airports. If these restrictive measures on international travel to Madagascar will last longer, the project team may consider a request to redirect the budget allocation for international travels to support other components of the project.

15. Safeguarding

Please tick this box if any safeguarding or human rights violations have occurred during this financial year. ☐

If you have ticked the box, please ensure these are reported to ODA.safeguarding@defra.gov.uk as indicated in the T&Cs.

The World Vegetable Center has a Safeguarding Policy in place to protect vulnerable people. This policy guides project implementation at the institute and includes review of all research and development projects involving human participants by the Institutional Biosafety and Research Ethics Committee (IBREC). Only projects approved by IBREC can be implemented.

16. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2020 – 31 March 2021)

Project spend (indicative) since last annual report	2020/21 Grant (£)	2020/21 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)	[redacted]			
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Monitoring & Evaluation (M&E)				
Others (see below)				
TOTAL				

17. Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2020-2021

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
Impact Traditional vegetable production is culturally and commercially attractive for small-scale vegetable growers in Madagascar, offering a wide range of vegetables to improve food and nutrition security of Malagasy households.		-More than 1,000 households reached in year 2 with seeds of TAVs promoted by the project. -Sales of the promoted vegetable crops have improved by 75% on average for the 200 women farmers. -Six schools out of eight now have their school gardens and provide school meals for the children for the first time.	
Outcome *Protection and enhancement of genetic resources of traditional vegetables in Madagascar resulting in increased access to vegetables for 15,000 Malagasy people, climate-resilient farming systems, and improved protection of*	**0.1.** At least 1,000 farmer households in the Itasy and Antsirabe regions report a 25% increase of their overall income and an 25% more stable income by growing traditional vegetables (survey sample = 200 farmers participating directly in the project and 200 randomly selected farmers not participating directly) **0.2.** Farmer families that grow traditional vegetables are food and nutrition secure through the whole year. **0.3.** At least 400 accessions of vegetable landraces from Madagascar are protected *ex-situ.* **0.4.** School children in the participating primary schools increased their knowledge and improved their attitude regarding consumption, nutrition, and taste of traditional vegetables **0.5.** 100% increase in sales of traditional vegetable seeds.	**0.1.** More than 1,000 households reached with improved seeds of TAVs and sales improved by 75% on average for amaranths, nightshade and African eggplant **0.2.** Of the 200 trained women farmers, 45% reported having now enough vegetables to feed their families. The rest of the farmers (55%) reported an average deficit of 30% of their consumption needs. **0.3** 611 TAV accessions were collected in year 2. **0.4.** The mothers of the school children involved in the biodiversity-rich school garden program have reported that their children are eating more vegetables and refer to the nutrition trainings, which they received at school by project.	**1.1.** Intensify the training of the 200 women farmers on seed saving, vegetable production and seed business in year 3. Conduct the endline survey to evaluate the increase in overall income. **1.2.** Assess the food security status of the beneficiary households versus the control group in year 3. **1.3.** Further collection will target crop wild relatives in year 3. Obtain the germplasm export permit and conserve the collected materials in WorldVeg genebank in Tanzania. **1.4.** Monitor the knowledge and attitude of the participating school children towards traditional vegetables. **1.5.** Monitor the sales and income earned from vegetable farming in beneficiary households in year 3.

vegetable biodiversity.		**0.5.** Sales of the promoted vegetable crops have improved by 75% on average for the 200 women farmers.	
Output 1. Good understanding of the status of agro-biodiversity in Malagasy food systems	**1.1.** Hotspots of Malagasy crop diversity in **year 1** determined on the basis of GIS analysis and GBIF herbarium records of food plants listed to grow in Madagascar. **1.2.** Agro-biodiversity four-cell assessments in at least six communities in different agroecological zones to understand the use and consumption of vegetables and other cultivated and wild food plants in Madagascar in **year 1 and 2.**	**1.1.** Three hotspots of traditional African vegetable crop diversity determined in Madagascar: in the Northern, Southern and Eastern part of Madagascar (evidence provided in section 3.1. of report, and Appendix 4) **1.2.** Agrobiodiversity four-cell assessments conducted in eight communities in different agroecological zones, in year 1 and 2 (evidence provided in section 3.1. of report).	
Activity 1.1. Hotspots of traditional vegetable diversity in year 1 determined with GIS		Completed.	The identified biodiversity hotspots guided collecting missions in year 2.
Activity 1.2. Agro-biodiversity four-cell assessments in at least six communities in year 1 and 2.		Completed. Six planned and eight completed.	Analyse the data and disseminate results.
Output 2. Protected and characterized genetic resources of vegetable diversity	**2.1.** Germplasm collection of traditional vegetables and their wild relatives in different agroecological zones in collaboration with farmer groups in **year 2.** **2.2.** Seed multiplication and characterization of collected vegetable landraces in Madagascar and Arusha in **year 1, 2 and 3.** **2.3.** At least 1 publication submitted on morphological characterization of landraces of traditional vegetables in **year 3.**	**2.1.** 611 accessions collected in year 2 (evidence provided in section 3.1. and Passport data available upon request). **2.2.** Seeds of 14 varieties of amaranths, African nightshade, African eggplant were multiplied in year 1 (10 kg) and year 2 (11kg) and 500 seed kits were developed and distributed to FOFIFA and farmers in Madagascar (evidence in Section 3.1 and in Appendix 6). Farmers have cultivated these crops in two cropping seasons (evidence provided in section 3.1.). **2.3.** The distributed germplasm is evaluated for adaptation to the Malagasy environment (Evidence in section 3.1 of this report, and section 2.2. of Appendix 15). A journal publication is planned for year 3.	
Activity 2.1. Germplasm collection in year 2.		Completed	Germplasm transfer to WorldVeg genebank in year 3
Activity 2.2. Seed multiplication and characterization in year 1, 2 and 3.		Seed multiplication completed in year 1 and 2. Farmers have evaluated the varieties in year 1 and 2. A genebank review conducted by the Crop Trust (evidence provided in year 1 annual report)	Seed multiplication and characterization will continue in year 3
Activity 2.3. At least 1 publication submitted on morphological characterization of landraces of traditional vegetables in year 3.		Planned for year 3. But preliminary results available and a poster developed.	The publication will be submitted by the end of year 3 as planned.
Output 3. Malagasy extension	**3.1.** 25 extension workers, of which at least 60% women, attend a 3-day training-of-trainers course on seed saving of traditional vegetables and vegetable growing in **year 1, 2, and 3.**	**3.1.** A 3-day training was conducted for extension workers (68% women) in year 1 (evidence provided in section 3.1. and in Appendix 15) 3.2. Three seed saving videos were translated into Malagasy in year 1	

workers, trained on seed saving and production of traditional vegetables.	**3.2.** Seed saving videos translated into Malagasy **in year 1.** **3.3.** 1 seed saving leaflet in Malagasy developed **in year 1.** **3.4. 1** home garden guide in Malagasy developed **in year 1.** **3.5.** 200 small-scale women farmers receive five 2-day trainings during the project duration by extension workers on seed saving of traditional vegetables and vegetable growing. **3.6.** 250 seed kits developed per year of promising varieties of African nightshade, African eggplant, amaranth, Ethiopian mustard among other crops to provide seeds to the 200 women farmers for varietal evaluation and NGOs that participate in regional school and home garden programs in **year 1 and 2.** **3.7. Participatory evaluation** by 200 women farmers of promising introduced and local varieties of traditional vegetables in **year 2 and 3.** **3.8. Two network analyses** in respectively the Itasy and Antsirabe regions to understand flow of seeds supplied to women farmers within communities **in year 3**. **3.9. Household surveys for monitoring and evaluation** with 200 women farmers involved in the project and 200 who are not involved.	**3.3.** Four leaflets on seed saving were translated into Malagasy in year 1 (evidence provided in section 3.1.) 3.4. Four leaflets on home gardens were translated into Malagasy in year 1 (evidence provided in section 3.1.) **3.5.** 200 small-scale women farmers received one 2-day trainings in year 1 and 2 by extension workers on seed saving of traditional vegetables and vegetable production. (evidence provided in section 3.1. and in Appendix 15) **3.6.** 250 seed kits (11 kg) developed in year 2 for 14 promising varieties of African nightshade, African eggplant, amaranth, Ethiopian mustard, and pumpkin, and distributed to the 200 women farmers for varietal evaluation and to the local NGOs that are participating in regional school and home garden programs. (evidence provided in section 3.1. and in Appendix 15.) **3.7.** The participatory evaluation of vegetable varieties by the 200 women farmers was conducted. (evidence provided in section 3.1. and in Appendix 15.) **3.8.** Not started, planned for year 3. **3.9.** Baseline household surveys conducted in year 1 among 200 women involved and another 200 not involved in the project (evidence provided in the previous annual report)	
Activity 3.1. 25 extension workers farmers attend a 3-day training-of-trainers course in year 1, 2, and 3.		The planned training for year 2 is completed	Intensify the training for extension workers in year 3
Activity 3.2. 1 seed saving video translated into Malagasy in year 1		Completed	Completed
Activity 3.3. 1 seed saving leaflet in Malagasy developed in year 1.		Completed	Completed
Activity 3.4. 1 home garden leaflet in Malagasy developed in year 1.		Completed	Completed
Activity 3.5. 200 small-scale women farmers receive five trainings during the project duration in year 1, 2, and 3.		The planned training for year 2 is completed	Intensify the training for extension workers in year 3
Activity 3.6. 250 seed kits developed per year of promising varieties for 200 women farmers in year 1, 2, and 3 and NGOs that coordinate regional home and school garden projects.		The planned multiplication and seed kits for year 2 completed.	Multiply and distribute the same amount of seed kits to the Malagasy partners and farmers in year 3.
Activity 3.7. Participatory evaluation by 200 women farmers in year 2 and 3.		Participatory evaluation completed in year 2.	Continue the participatory evaluation in year 2 by including new landraces that will be collected in year 2 in Madagascar.
Activity 3.8. Two network analyses in respectively the Itasy and Antsirabe regions to understand flow of seeds supplied to women farmers within communities in year 3.		Not started, planned for year 3	Planned for year 3

Activity 3.9. Household surveys for monitoring and evaluation with 200 women farmers involved in the project and 200 who are not involved.		The baseline surveys were completed in year 1.	Endline surveys planned for year 3
Output 4. School garden programs strengthened to promote conservation and use of agro-biodiversity	4.1. Biodiversity-rich school gardens established in five primary schools in year 2 and 3. 4.2. Focus-group discussions with school children and care takers to understand their awareness, knowledge, perceptions about traditional vegetables in year 2 and year 3. 4.3. Agro-biodiversity catalogue of Malagasy vegetables in year 2. 4.4. Conference organized with NGOs, regional authorities, and school directors organized on how to incorporate local food plant diversity in regional school garden programs in year 3.	**4.1.** Eight biodiversity-rich school gardens established in year 2, from five initially planned **4.2.** Eight FGDs have been conducted with the school children and their caretakers in year 2, respectively (evidence in section 3.1 and in Appendix 15). **4.3.** A draft ABD catalogue is developed in year 2 (Appendix 9) **4.4.** not started yet, planned for year 3	
Activity 4.1. Biodiversity-rich school gardens established in five primary schools in year 2 and 3.		Completed in year 2	Continue the activities with eight biodiversity-rich school gardens in year 3
Activity 4.2. Focus-group discussions with school children and caretakers in year 2 and year 3.		Completed in year 2	Complete the follow up M&E in year 3 to assess the impact of the project on the school children and their caretakers' awareness, knowledge, perceptions about traditional vegetables
Activity 4.3. Agro-biodiversity catalogue published in year 2.		A draft ABD catalogue is developed in year 2	Publish the agro-biodiversity catalogue in year 3.
Activity 4.4. Conference organized with NGOs, regional authorities, and school directors organized about the value and benefits of growing traditional vegetables for income generation and nutrition in year 3.		Planned for year 3, however the planning of regional school gardens program conference has started in year 2	Conduct the regional school gardens program conference in year 3.
Output 5. Malagasy women farmers trained on seed production for commercializati on.	**5.1.** At least 10 progressive women farmers attend a 3-day training course on seed production, storage, and commercialization of promising varieties of traditional vegetables in **year 1, 2, and 3**. **5.2:** At least 10 progressive farmers will develop seed business to sell seeds of traditional vegetables in local markets or as part of collaboration with the seed company SEMANA in **year 2 and 3**.	**5.1.** 11 progressive women farmers were trained by SEMANA and a local NGO in year 2. **5.2.** 11 progressive women farmers are developing seed business and are selling seeds of TAVs in local markets	
Activity 5.1. At least 10 progressive women farmers attend a 3-day training course on seed production and commercialization in year 1, 2, and 3.		Completed for year 2	Training of 11 progressive women farmers on seed production and commercialization will continue in year 3
Activity 5.2. At least 10 progressive farmers will develop seed businesses in collaboration with the vegetable seed company SEMANA in year 2 and 3.		Completed for year 2	SEMANA will continue the trainings and collaboration with the 11 progressive women farmers to develop seed business and selling seeds of TAVs

18. Annex 2: Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Traditional vegetable production is culturally and commercially attractive for small-scale vegetable growers in Madagascar, offering a wide range of vegetables to improve food and nutrition security of Malagasy households. (Max 30 words)			
Outcome: Protection and enhancement of genetic resources of traditional vegetables in Madagascar resulting in increased access to vegetables for 15,000 Malagasy people, climate-resilient farming systems, and improved protection of vegetable biodiversity. (Max 30 words)	**0.1.** At least 1,000 farmer households in the Itasy and Antsirabe regions report a 25% increase of their overall income and an 25% more stable income by growing traditional vegetables (survey sample = 200 farmers participating directly in the project and 200 randomly selected farmers not participating directly) **0.2.** Farmer families that grow traditional vegetables are food and nutrition secure through the whole year. **0.3.** At least 400 accessions of vegetable landraces from Madagascar are protected *ex-situ*. **0.4.** School children in the participating primary schools increased their knowledge and improved their attitude regarding consumption, nutrition, and taste of traditional vegetables **0.5.** 100% increase in sales of traditional vegetable seeds.	**0.1.** Development outcome household survey developed by WorldVeg socio-economist is used as baseline and monitoring at the beginning and end of the project. These assessments allow to measure improvements in livelihoods of women farmers and their households in the project intervention sites during and after the project. **0.2.** A survey report about growing, consumption, and selling of traditional vegetable crops at the beginning and end of the project allows measuring the increase in utilization of traditional vegetables by farmers in the Itasy and Antsirabe regions. **0.3.** Passport data of at least 400 accessions are uploaded to the Genesys Webpage, the global portal to genetic resources https://www.genesys-pgr.org/ so that people can access the information and contact details to access germplasm. **0.4.** Focus-group discussions with school children and their caretakers in year 2 and 3 of the project allows to understand increase in knowledge and appreciation of traditional vegetables by school children and their caretakers. **0.5.** Statistics on the seed sales of traditional vegetables by progressive women farmers and the seed company SEMANA at the beginning and end of the project allow measuring the increase in seed commercialization.	The project estimates to indirectly impact 15,000 Malagasy people on the basis of the following assumptions: For each of 1,000 farmers growing traditional vegetables in the Itasy region, at least 3 households with on average 5 household members will increase their consumption of traditional vegetables because of improved access to the vegetables. 3 households *x* 5 members *x* 1,000 farmers = 15,000 Malagasy people
Outputs: **1**. Good understanding of the status of agro-biodiversity in Malagasy food systems	**1.1.** Hotspots of Malagasy crop diversity in **year 1** determined on the basis of GIS analysis and GBIF herbarium records of food plants listed to grow in Madagascar. **1.2.** Agro-biodiversity four-cell assessments in at least six communities in different agroecological zones to understand the use and consumption of vegetables and other cultivated and wild food plants in Madagascar in **year 1 and 2.**	**1.1.** Species diversity maps developed to identify geographic patterns of the diversity of traditional vegetable crops. **1.2.** Report made available about the agro-biodiversity four-cell assessments.	Communities can be accessed for, and are willing to participate in the agro-biodiversity four-cell assessments.

2. Protected and characterized genetic resources of vegetable diversity	**2.1.** Germplasm collection of traditional vegetables and their wild relatives in different agroecological zones in collaboration with farmer groups in **year 2.** **2.2.** Seed multiplication and characterization of collected vegetable landraces in Madagascar and Arusha in **year 1, 2 and 3.** **2.3.** At least 1 publication submitted on morphological characterization of landraces of traditional vegetables in **year 3.**	**2.1.** Passport data of at least 400 collected vegetable landraces is being uploaded to the Webpage of the Genesys, the global gateway to plant genetic resources https://www.genesys-pgr.org/. **2.2a.** Report with characterization data of the collected vegetable landraces is made available. **2.2b.** External review of seed multiplication and conservation done by the Crop Trust. **2.3.** Confirmation of journal of receipt of manuscript.	FOFIFA will obtain permits with the corresponding national authorities in consultation with the ITPGRFA focal point to collect and ship seeds to the WorldVeg genebank of traditional African vegetables in Arusha, Tanzania.
3. Malagasy extension workers, trained on seed saving and production of traditional vegetables.	**3.1.** 25 extension workers, of which at least 60% women, attend a 3-day training-of-trainers course on seed saving of traditional vegetables and vegetable growing in **year 1, 2, and 3.** **3.2.** Seed saving videos translated into Malagasy **in year 1.** **3.3.** 1 seed saving leaflet in Malagasy developed **in year 1.** **3.4. 1** home garden guide in Malagasy developed **in year 1.** **3.5.** 200 small-scale women farmers receive five 2-day trainings during the project duration by extension workers on seed saving of traditional vegetables and vegetable growing. **3.6.** 250 seed kits developed per year of promising varieties of African nightshade, African eggplant, amaranth, Ethiopian mustard among other crops to provide seeds to the 200 women farmers for varietal evaluation and NGOs that participate in regional school and home garden programs in **year 1 and 2.** **3.7. Participatory evaluation** by 200 women farmers of promising introduced and local varieties of traditional vegetables in **year 2 and 3.** **3.8. Two network analyses** in respectively the Itasy and Antsirabe regions to understand flow of seeds supplied to women farmers within communities **in year 3**. **3.9. Household surveys for monitoring and evaluation** with 200 women farmers involved in the project and 200 who are not involved.	**3.1.** Minutes and five photos per training course. **3.2.** YouTube link to seed saving video. **3.3.** Signed receipt by women farmers of seed saving leaflets. **3.4.** Signed receipt by women farmers of home garden leaflets. **3.5.** Minutes and five photos per capacity development event. **3.6.** Signed receipt by farmers of received seed kits. **3.7.** Data deposited on WorldVeg repository. **3.8.** Report on network analyses made available. **3.9.** Household survey data deposited on WorldVeg repository	Communities can be accessed by extension workers and MSc students to support capacity development of women farmers and to support school gardens and other agro-biodiversity activities in primary schools.
4. School garden programs strengthened to promote conservation and use of agro-biodiversity	**4.1. Biodiversity-rich school gardens** established in five primary schools **in year 2 and 3.** **4.2. Focus-group discussions with** school children and care takers to understand their awareness, knowledge, perceptions about traditional vegetables **in year 2 and year 3.** **4.3.** Agro-biodiversity catalogue of Malagasy vegetables **year 2.**	**4.1.** Reports available on the school garden establishment. **4.2.** Report available on the focus-group discussions. **4.3.** Agro-biodiversity catalogue in Malagasy and English **4.4.** Workshop proceedings.	School directors give permission to establish school gardens.

	4.4. **Conference** organized with NGOs, regional authorities, and school directors organized on how to incorporate local food plant diversity in regional school garden programs **in year 3.**		School directors and care takers give permission to interview school children. Students and teachers maintain school gardens.
5. Malagasy women farmers trained on seed production for commercialization.	**5.1.** At least 10 progressive women farmers attend a 3-day training course on seed production, storage, and commercialization of promising varieties of traditional vegetables in **year 1, 2, and 3.** **5.2:** At least 10 progressive farmers will develop seed business to sell seeds of traditional vegetables in local markets or as part of collaboration with the seed company SEMANA **in year 2 and 3.**	**5.1.** Minutes of and five photos of capacity development events. **5.2.** Amount of seed sold by women seed producers in collaboration with the seed company SEMANA.	Progressive women farmers are interested to develop seed businesses

Activities

Activity 1.1. Hotspots of traditional vegetable diversity in year 1 determined with GIS
Activity 1.2. Agro-biodiversity four-cell assessments in at least six communities in year 1 and 2.
Activity 2.1. Germplasm collection in year 2.
Activity 2.2. Seed multiplication and characterization in year 1, 2 and 3.
Activity 2.3. At least 1 publication submitted on morphological characterization of landraces of traditional vegetables in year 3.
Activity 3.1. 25 extension workers farmers attend a 3-day training-of-trainers course in year 1, 2, and 3.
Activity 3.2. 1 seed saving video translated into Malagasy in year 1
Activity 3.3. 1 seed saving leaflet in Malagasy developed in year 1.
Activity 3.4. 1 home garden leaflet in Malagasy developed in year 1.
Activity 3.5. 200 small-scale women farmers receive five trainings during the project duration in year 1, 2, and 3.
Activity 3.6. 250 seed kits developed per year of promising varieties for 200 women farmers in year 1, 2, and 3 and NGOs that coordinate regional home and school garden projects.
Activity 3.7. Participatory evaluation by 200 women farmers in year 2 and 3.
Activity 3.8. Two network analyses in respectively the Itasy and Antsirabe regions to understand flow of seeds supplied to women farmers within communities in year 3.
Activity 3.9. Household surveys for monitoring and evaluation with 200 women farmers involved in the project and 200 who are not involved.
Activity 4.1. Biodiversity-rich school gardens established in five primary schools in year 2 and 3.
Activity 4.2. Focus-group discussions with school children and caretakers in year 2 and year 3.
Activity 4.3. Agro-biodiversity catalogue published in year 2.
Activity 4.4. Conference organized with NGOs, regional authorities, and school directors organized about the value and benefits of growing traditional vegetables for income generation and nutrition in year 3.
Activity 5.1. At least 10 progressive women farmers attend a 3-day training course on seed production and commercialization in year 1, 2, and 3.
Activity 5.2. At least 10 progressive farmers will develop seed businesses in collaboration with the vegetable seed company SEMANA in year 2 and 3.

19. Annex 3: Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
2	MSc students involved in project activities	Male (71.43%) Female (28.57%)	Malagasy	6	1		7	8
6A	Training of extension workers on seed saving and vegetable production trainings	Male (32%) Female (68%)	Malagasy	25	25		25	25
6A	Training of women farmers on seed saving and vegetable production trainings	Female (100%)	Malagasy	200	200		200	200
6.B	Training of extension workers	Male (32%) Female (68%)		3	3		6	9 days
6.B	Training of 200 women beneficiaries	Female		2	3		5	10 days
7	Leaflets and videos on general nutritional information, and home gardening for four TAV crops (see a sample signed receipt of leaflets in Appendix 4)			15	15		15	12
11B	The GIS analysis to identify hotspots, submitted for peer-review			1	0		1	1
14B	Stakeholders workshop to raise the profile of TAVs			1	0		1	1
20	Computers, field cameras and accessories			[redacted]				[redacted]

Table 2 Publications

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
Diversity and conservation of traditional African vegetables: Priorities for action	Journal	van Zonneveld et al., 2021	Male	Dutch	Wiley	https://onlinelibrary.wiley.com/doi/full/10.1111/ddi.13188
Agro-morphological characterization of traditional African vegetables cultivated in the highlands of Madagascar	Poster	Rakoto et al., 2021	Female	Malagasy	N/A	https://avrdc.org/download/tav-posters/RAKOTOSON-Tatiana.pdf
Traditional African Vegetables Strengthen Food and Nutrition Security in Madagascar	Poster	Rabary et al., 2021	Female	Malagasy	N/A	https://www.fofifa.mg/wp-content/uploads/2021/01/Poster_TAVs_Bodovololona-Rabary_Madagascar.pdf
Diversity and use of traditional vegetables in two regions of Madagascar: Itasy and Vakinankaratra	Abstract for oral presentation	Radanielina et al., 2021	Male	Malagasy	N/A	https://avrdc.org/download/tav-abstracts/1-13_Tendro-Radanielina_Diversity-and-use-of-Madagasc.pdf
Production and utilization of traditional African vegetables in Madagascar	Abstract for oral presentation	Luoga et al., 2021	Female	Tanzanian	N/A	https://avrdc.org/download/tav-abstracts/2-5_Luoga-Ritha_Production-and-utilization-of-trad-in-Madaga.pdf

● Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Yes
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	No
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	