



Funded

HIAL Desert Greening Initiative

Progress Report

April – June 2020 (6th Project Quarter)



HIMALAYAN INSTITUTE OF ALTERNATIVES, LADAKH

An Alternative Institute for Mountain Development

Pioneering



20 July 2020

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Progress Summary

This quarter, April to June 2020, we have advanced on a number of fronts, despite being severely delayed in our spring planting season due to the lockdowns imposed because of the COVID-19 pandemic.

Many native seeds have been sown in both the Biofence plantation, the Apple Orchards and in small landscaping projects throughout the site. Upkeep of cuttings in the greenhouse is occurring as well as progress in securing the construction contract for our second greenhouse is underway.

Maintenance of Apple Orchards in terms of regular watering as well as fertilisation using compost and manure, has occurred. Unfortunately, the Apple Orchard extension could not be done as the planting period has been missed, again because of the COVID-19 pandemic and the subsequent closure of borders between UT Ladakh and UT Jammu & Kashmir. We will pick this up in spring next year. In the meantime, we have been adding soil amendments to these new orchard rows which will give the new trees the best start possible.

Development of our novel irrigation system for the small Apple and Apricot Orchard, using grey water and urine, has recommenced after lockdown. We are getting ready to lay pipes and conduct the first tests of the passive, low input system.

Nursery beds have been prepared, sculpted and treated with soil amendments. Many native seeds have been sown here and germinations are already being seen. Additions to the Nursery 1 infrastructure have been made, which include further supporting poles and deeper, stronger frame bases. This will help prevent further damage to the whole installation by gale force winds.

General maintenance is occurring with daily watering, weeding and monitoring of growth. We are additionally working on team-level design, visionary and strategic planning as well as capacity building. This year will see staff members be trained by experts in useful skills such as composting, orchard management, tractor driving, plumbing or electrical work. This will provide much needed technical skills to our team as well as sparking the interest for continual learning by our staff.

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Introduction to the project

The Himalayan Institute of Alternatives, Ladakh (HIAL) is undertaking a massive Desert Greening initiative with the immense support of the Make My Trip Foundation (MMT Foundation). The campus of this new education institute is situated on a desert area of 125 acres in a valley of Ladakh, approximately 20 kilometres from the region's main city of Leh. HIAL's vision is to create an alternative and sustainable development model for the Hindukush Himalayas and to mountain regions beyond. HIAL is focused on creating new paradigms of 'learning by doing' whilst creating a platform for the rejuvenation and incorporation of indigenous knowledge and contextual-based learning.

The Make My Trip Foundation is a public charitable trust and is passionate about sustainable and responsible development in India. The Foundation hand selects initiatives to support which are working to promote and ensure environmental sustainability, carbon sequestration and responsible tourism. They believe in inclusively supporting disadvantaged communities throughout India across sectors like education as well as ecological restoration. In funding the formative stages of HIAL's Desert Greening initiative, they are helping to establish the foundation for ongoing carbon sequestration and biodiverse land generation which will have impacts far beyond the campus boundary.

The greening of HIAL's campus, funded by the MMT Foundation, will provide a strong platform and hub for research and development of desert afforestation techniques and methodologies that seeks to inspire and inform other high-altitude mountain regions of the Himalayas and the world. The Forestation team at HIAL is parallelly working on building up the capacity of the site's infrastructure, knowledge base and planting material resources to support large scale plantations on this campus. With this strong foundation, the Forestation project is working towards greening 70% of HIAL's campus with perennial and native plant species. This greening will have a plethora of localised benefits: from sequestering carbon; providing enhanced human habitat for staff and student residents; creating new ecological habitat for wildlife including birds, insects and reptiles; increase the water-holding capacity of the landscape - allowing for water conservation and reducing the water run-off and soil erosion which can contribute to catastrophic flooding events in mountain valleys.

As the capacity of HIAL's Forestation initiatives advances, through the support of the MMT Foundation, these localised approaches, experiments and successes can be spread throughout similar regions to produce widespread benefits. This alternative educational institute can be one of the many catalysts necessary to create a stronger movement towards localised solutions to global and shared problems.

Project Progress Report

Miyawaki Pilot Plantation

Miyawaki plantation method review

The Miyawaki method of afforestation has been demonstrated in thousands of locations around the world, including in desert ecosystems, and generally shows astounding rates of growth and supports a great diversity of flora and fauna. This afforestation or forestation technique (the former referring to plantation on a land with no previous forest vegetation, whilst the latter has historically supported forest ecosystems), was developed by a Japanese Phytosociologist who explored and scientifically examined the components and interactions in protected 'shrine forests' around Shinto temples. Miyawaki determined that vegetation in these indigenous, natural forest ecosystems could be categorised into four layers – main tree species, subspecies, shrubs and ground-covering herbs¹. Through these studies, Miyawaki began designing his own system for planting forests.

The method involves bringing a 'future forest' to a planting site, complete with a rich forest soil amended according to the local soil type and what resources are available locally. As well, a large mix of these four different types of species, usually 50-100 species are planted very densely in a random combination together, as they would occur in a wild forest¹. This process acts to speed up nature's natural work and gives all the different layers of species with what they would normally need from a forest ecosystem – shade, protection and the sharing of nutrients between diverse root systems. For the first 2 – 3 years, the forest is watered and monitored, so that as many species as possible have a chance to survive. Thereafter, the forest is left to nature's hands – not watered or weeded, and certainly not culled for forestry.

Species wise outcomes

Below is the list of the 10 species which were planted in the Miyawaki Pilot Plantation Forest in April 2019. Five out of ten species have suffered moderate to severe losses and range between 3% to 38% survival. Four species have shown no survival whilst one species, *Lepidium latifolium*, has proliferated (see Figure 1), nearly doubling itself from the original number planted.

Table 1. Miyawaki Pilot Plantation Species-wise Numbers Surviving & Percentage

S. No.	Botanical name	Common name	No.	Survival 16-June 2020	
			No.	No.	Percentage
1	<i>Juniperus excelsa polycarpus</i>	Juniper, 'Shukpa'	336	128	38
2	<i>Rosa webbiana</i>	Wild Rose, 'Siah'	336	11	3
3	<i>Hippophae rhamnoides</i>	Seabuckthorn, 'Tsermang'	336	37	11
4	<i>Lepidium latifolium</i>	'Shangsho'	288	568	197
5	<i>Tanacetum gracile</i>	'Burtsay'	120	0	0
6	<i>Ephedra intermedia</i>	'Chapat'	144	0	0
7	<i>Peganum harmala</i>	Wild Rue	144	12	8
8	<i>Krascheinnikovia sp.</i>	---	192	5	3
9	<i>Artemisia brevifolia</i>	'Khamchu'	72	0	0
10	<i>Carex sp.</i> - Unidentified grass		432	0	0
		Total	2400	761	32%

¹ Nargi, L. (2019) 'The Miyawaki Method: A Better Way to Build Forests?' *JSTOR Daily*, 24 July.



Figure 1. *Lepidium latifolium*, 'Shangsho', proliferating in the Miyawaki Pilot Plantation (May 26, 2020).

Analysis of the outcomes

The outcome of this Pilot Plantation can best be understood from a species-by-species analysis. This is because each species was collected or procured in a different manner and because each plant has a unique set of requirements in terms of transplantation care and water. This section will outline some of the common conditions of different species.

Firstly, Water. The Miyawaki method for watering as prescribed by HIAL's afforestation consultancy group, *Afforestt*, was based on a multiplication of Ladakh's annual precipitation. Every irrigation event was calculated to wet every one square metre of ground with one litre of water. This equates to 1/100th of Ladakh's annual precipitation. Given that we irrigate for more than 100 days in the year, the amount of water the plantation receives is greater than the annual precipitation. After the two-year period of irrigation prescribed by *Afforestt*, all irrigation is to stop.

However, plant growth in Ladakh, except in the desert areas for those few desert herbs and shrubs which normally exist there, is not determined by precipitation alone. Glacial melt water accounts for the great majority of water most plants receive. This effect can be seen in Ladakh's inhabited green valleys – the 'oasitic ecozones'. Importantly, this 100mm of annual precipitation mostly falls in winter time as snow and does not support life for most of the growing season.

The effect we see where one species, *Lepidium latifolium*, has proliferated may be due to the fact that this non-woody plant with surface lying root systems, is able to best capture the small amount of superficial soil moistening. Most other plants that have been experimented with in the Pilot Plantation, are either usually found in these oasitic ecozones and/or are featuring woody and tap root systems which cannot make use of brief, surface irrigation, even as a daily procedure.

The second major point for analysis pertains to the transplantation process. To summarise, the herbaceous species were gathered from the wild in early spring 2019 are highly likely to have suffered

from excessive transplant shock². For the two shrub species, *R. webianna* and *H. rhamnoides* (see Figure 2), although collected at the ideal time in pre-spring, both are highly likely to have dried out during the transplantation and pre-planting period. This process of uprooting 'bare rooted' plants (in the case of *R. webianna*) is known to increase the likelihood of transplant shock and drying-out³. As well, *H. rhamnoides* is a moisture-sensitive plant and especially prone to drying out during spring and during transplanting⁴.

In sum, the two major reasons pertaining to the low survival rates of Pilot Plantation plants, are suggested to be insufficient irrigation water (in terms of quantity per application) and transplantation shock and co-involved drying-out. These reasons have been found to be the environmental and management conditions which all the plants have in common.



Figure 2. (left) *Rosa webianna*, Wild Rose, flowering in Pilot Plantation (June 3, 2020) and (right) *H. rhamnoides*, Seabuckthorn, growing in Pilot Plantation (May 26, 2020).

Miyawaki going forward

To address the issue of transplanting shock, future plantations need to occur using managed sources of propagated plants and not the uprooting of wild plants. Therefore, the development and expansion of HIAL's nurseries through the mass collection of planting material, is imperative to success. A major part of this nursery development and expansion must involve the propagation research of native herb species as well as the refinement of shrub propagation process through cuttings.

² Peace Corps. (1978). Intensive Vegetable Gardening for Profit and Self-Sufficiency. *Peace Corps*, 1978, 158 p.

³ Pecknold, C. (2001). Transplant Shock of Trees and Shrubs, BP-31-W. *Cooperative Extension Service*. Department of Botany and Plant Pathology, Purdue University.

⁴ Stobdan, T., Chaurasia O.P., Korekar, G. & Balaji, B. (2011). In book: *Innovatives in Agro Animal Technologies*, Chapter: Seabuckthorn Production for Greening and Sustainable Income Generation in Cold Desert of India, Publisher: SATISH SERIAL PUBLISHING HOUSE, Editors: R.B. SRIVASTAVA, W.SELVAMURTHY, pp.71-86.

The irrigation schedule for all plantations needs to be revised with the sanction of our consultants *Afforestt*, to be more consistent to local methods. Ladakh's people have been successfully greening their valleys and even some desert areas for centuries and generally practice lower frequency watering with larger quantities of water. This ensures that multiple soil layers are moistened so that a majority of water is not lost to the high surface evaporation rates.



Figure 3. (left) *Krascheinnikovia sp.* growing well in Pilot Plantation and (right) *P. harmala*, Wild Rue, growing well in Pilot Plantation (May 26, 2020)

Biofence Plantation

This quarter we have been maintaining the Biofence plantation which consists of 4,710 plants of three different native shrub species; *Hippophae rhamnoides* – Seabuckthorn, *Rosa webianna* – Wild Rose and *Myricaria germanica* – locally known as ‘Umbu’. These plants were planted into the HIAL site fence-line boundary which had been prepared using the Miyawaki method soil preparation. We are regularly monitoring the growth of these plants which are continuing to show new growth despite us heading towards the latter part of the growing season.



Figure 4. (left) *H. rhamnoides*, Seabuckthorn, growing in the Biofence Plantation and (right) *R. webianna*, Wild Rose, growing in the Biofence plantation (June 23, 2020).



Figure 5. (left) *M. germanica* growing and flowering in the Biofence Plantation and (right) *Nepeta flucoosa*, Shamalolo, growing and flowering in the Biofence Plantation (June 23, 2020).

On World Environment Day which is celebrated on June 5th, we engaged all HIAL staff in a ‘seed bombing’ plantation initiative (see Figure 6). Using seed balls which we prepared, consisting of manure, clay and seeds, we ‘bombed’ the Biofence plantation area with the seeds of native herbs and flowering plants (see Figure 6). This aims to increase the diversity of the Biofence plantation to include at least 7 native shrub and herb species, similar to a Miyawaki plantation. We expect to see the emergence of some of these seedlings in the coming months.



Figure 6. (left) Staff ‘seed-bombing’ in the Biofence and (right) Seed balls beneficial for large scale planting (June 5, 2020).

Apple Orchards

This spring and early summer quarter work has consisted of watering every second day through the water-saving and gravity-fed drip irrigations system, as well as organic fertilising using cow manure and a mixture of composts including vermicompost that we have procured from nearby farms. Early spring fertilising was managed during the lockdown period and a good number of flowers were observed in spring time. Again, at the end of June, during the fruiting period, we have provided additional manure using the 'ring fertilising' method (see Figure 7). This involves digging a small circular trench around each tree and burying organic inputs for the shallow rooting system to uptake.



Figure 7. Ring fertilisation of apples has been done twice this season (June 29, 2020).

Given that COVID-19 lockdown was not loosened in Ladakh until late May, and still continues on in Srinagar, we have not been able to procure and install the new apple orchards we had hoped to plant this year. It is very important that fruit trees are planted at the right time of year, so we will be delaying this plantation of 792 apple trees in the spring of 2021. We did manage to plant 5 more apple trees in our smaller Apple and Apricot Orchard as an additional part of our World Environment Day celebration (see Figure 8).



Figure 8. Planting Apple saplings with HIAL staff on Environment Day, June 5th, 2020.

Our windbreak fence which was erected during last quarter (Q4'19) has been a great success in that it is withstanding the very strong winds present during spring and summer time. Unfortunately, these strong winds are contributing to a low fruit set, as pollination is disrupted during the flowering stage (see Figure 9). Therefore, a large part of Forestation team's work this year will be in planning for and executing large scale windbreak tree plantations. These windbreaks will, over time, become the major protection against strong and damaging winds for both the buildings and the plantations.



Figure 9. (left) Flowering period for Orchard Apples (May 10, 2020) and (right) Fruit have set in some apple trees (June 24, 2020)

Additionally, we are working on the passive grey-water irrigation system for the smaller Apple and Apricot Orchard near to our staff buildings. With the use of skilled labour, channels are being levelled to ensure every tree receives equal and sufficient water, which will be supplemented with fresh water and at times, urine for fertilisation. If this is successful, this would be a novel irrigation system that could more optimally utilise grey water waste on both smaller, household scales, and larger scales, in offices, at schools and beyond.

Greenhouse & Nursery Propagation

This quarter the primary activities within the nursery and greenhouse have been watering the plant cuttings and seeds. We have prepared nursery beds that are filling up with seeds collected last autumn and some already collected this summer (see Figure 10). We are successfully growing over 1,500 cuttings in the greenhouse and nursery of five different tree and shrub species; *Robinia pseudoacacia* – Black Locust, *Rosa webianna* – Wild Rose, *Hippophea rhamnoides* – Seabuckthorn, *Elaeagnus angustifolia* – Russia Olive and *Salix sp.* – Willow (see Figure 11 and Figure 13). Additionally, we are already seeing growth in approximately 1,500 seedlings of *R. pseudoacacia* alone, as well as various other plant species including small shrubs and herbs (see Figure 12). For those plants which have shown high amounts of growth this season, we will consider planting them outside this autumn, otherwise, to reduce the potential for mortality, we will wait until the upcoming spring, as is the tried and tested local practice.



Figure 10. Nursery bed preparation with pathways and water channels underway



Figure 11. (left) *E. angustifolia*, Russian Olive, cuttings growing in greenhouse and (right) *R. pseudoacacia*, Black Locust, seedlings growing in greenhouse (June 28, 2020).



Figure 12. (left) *R. pseudoacacia*, Black Locust, seedlings growing in the greenhouse attracting beneficial insects (June 28, 2020) and (right) *Echinops cornigerus*, Globe thistle, seedlings growing in the nursery (June 15, 2020)



Figure 13. (left) *E. angustifolia*, Russian Olive, cuttings flowering in the greenhouse and (right) *Salix sp.*, Willow, growing from cuttings in the greenhouse (June 28, 2020)

Challenges this Quarter

Lockdown during Spring:

This quarter has of course been challenging given that more than half of it (until last week of May) was under lockdown and most of our staff were not able to reach our campus for work. This meant that we had to forfeit most of our spring plantation plans and labour and other supplies were restricted.

Nursery Infrastructure:

Due to immense winds on site, our original nursery design, which had been informed by both an outside Forestry consultant group and a local ex-Forestry Department Official, could not withstand our site's conditions. We have thus spent much unplanned time on redesigning, procuring and installing these reinforcements as well as adjusting the shade netting. This had set us back in regards to seed sowing & planting material collection and propagation. We are still facing some issues with the nursery infrastructure and are searching for expert solutions.

Water Use & Availability:

We have additional requirements from our water system during summers due to resource sharing between the other departments and increased domestic uses. Since industrial works have been delayed due to lockdown, there has been a backlog of work of suppliers, however, we have managed to secure quotes on installing a new borewell and works will commence this quarter. This will greatly support Forestation team in its regular use requirements which are now spread throughout the site.

Staffing:

Our team head, Stanzin Angmo, has remained unavailable for this entire quarter as well due to being remotely located during and suffering further health issues. This has meant that the capacity and communication within the team has been a limitation. We are making plans to augment the team so that staff specialisations and interests can be supported and encouraged, making for clear streams of forestry as well as tree-based horticulture.

Financial Updates & Plans

The following section outlines the cost breakdown of all our works for the HIAL Desert Greening Projects. Firstly, the expenses for this quarter (Q1'20) are detailed under both cost head and project head including an explanation of any variances from the budgeted amounts. As well, our planned budgets for the upcoming quarter (Q2'20), also detailed under cost and project heads.

April – June Quarter 1, 2020

Below are the summarised expenses we have accrued this quarter, detailed under both cost head and project head, along with the variance from the budgeted totals and some comments.

Table 2. Cost Head-wise Expenditure for Q1 2020

Cost Head	Totals
Facility – Moveable	1,69,000
Material – Consumables	91,550
Material – Tools & Equipment	8,340
One Time Procurement – Facilities	7,780
Permanent Staff	3,68,833
Total	6,45,503

Table 3. Project Head-wise Budgeted, Utilised & Variance for Q1 2020

Project Head	Budgeted	Utilised	Variance	Comments
Apple Orchard	6,50,000	15,600	-97.60%	Plantation of the new orchards could not go ahead as consultants & suppliers in Srinagar remain in lockdown & state borders are not freely open.
Biofence Plantation	2,25,000	48,250	-78.56%	Numbers pertain primarily to labour costs & were utilised this quarter less than expected given their limited availability & the limited scope of the spring plantation.
Biomass Production – Animal Husbandry (formerly 'Compost')	12,00,000	2,000	-99.83%	Construction of the Cow Shed has started only at the end of this quarter as labour teams were still not available in Ladakh.
Nursery	2,25,000	1,72,675	-23.26%	Numbers pertain primarily to labour costs & were utilised this quarter mostly in the Nursery & Greenhouse watering & maintaining plants.
Commons	18,00,000	4,06,878	-77.40%	Borewell installation process has only just begun at the end of this quarter with the finalisation of the contract. The amount spent in <i>Commons</i> pertains to salaries & some site-wide labour work.
Total	41,00,000*	6,45,503	-84.26%	

*Funds not received from MMT but Rs ₹1,558,683 from last quarter utilised (see HIAL Project Financials MMT report, 04.07.2020)

Plans for the Next Quarter, July – September, 2020

This section explains the activities and timelines of the upcoming quarter. It also outlines the budget for this quarter according to the funds utilisation breakdown discussed in the review meeting held on May 13th.

The activities included under both these cost heads and project heads are also explained below as we transition to an improved categorisation system for costs and projects.

Details of Upcoming Activities

Nurseries & Greenhouses

We will be increasing the nursery space this coming quarter by preparing beds and planting many seeds which we will collect with staff and local labourers. Additionally, nursery irrigation infrastructure will be designed and installed this quarter.

The contract for the second greenhouse construction will be finalised shortly and work will commence this quarter. This can house cuttings that can be collected in the autumn period.

Windbreak Plantation

For expansive tree link plantations, we will research, design, procure and install drip irrigation systems which save water and are less manually intensive. Plants will be procured from some parts of J&K state in the autumn season and planted after September. As well we will need to procure some more soil amendments in the form of manure to improve the soil for these tree species. Primarily we will plant a drought-tolerant and fast-growing species called *Robinia pseudoacacia* – ‘Black Locust’ or ‘Kikar’, as they are likely to do well on our site, despite not being native. Next spring, we will supplement this plantation with native herbs and shrubs to make for a more biodiverse windbreak plantation.

Root Cellar

Works will begin on the root cellar this quarter. They will be executed by HIALs construction team and contract labour. This project will go to ensuring the food and nutrition security of staff and visitors during winter and is an essential facility of any Ladakhi household or residential institution.

Biofence Plantation

Through our ‘Nursery Scheme’ project, initiated this last quarter, we have engaged two suppliers to collect planting material, in the form of cuttings, and grow them on their own land. They will then sell us these plants in the coming seasons. Of these 50,000 plants we are expecting, 10,000 will be procured this autumn, 10,000 next spring and the further 30,000 in the autumn of 2021. We seek to engage more suppliers in the coming spring of 2021.

Other expenses under this project head will be for labourers to collect seeds and cuttings in autumn, and also to prepare potting bags on a huge scale, ready for a large planting material collection drive in the upcoming spring 2021. As the right season for collecting cuttings is short, we will spend this autumn and winter period preparing so we can be ready to do mass propagation in our nursery next year.

See the cost breakdown below for each project in the July – September quarter.

Table 4. Notes on revised Cost Heads

Cost Heads	Included Activities
Capital Expenditure	Procurement or maintenance of fixed assets. Purchase or fencing, fabrications of infrastructure, irrigation networks. (Formerly came under 'One Time Procurement-Facilities').
Labour	All daily wage workers, contracted labour
Planting Material	Saplings or Seeds purchased
Raw Materials	Manure, Compost, Leaves, Clay, other soil amendments
Materials & Equipment	Tools, consumable equipment or infrastructure like wiring, shade netting, gloves etc
Soil Preparation	Excavation, Digging or moving materials using JCB
Transport	Camper or other vehicle use, Tipper or Trucks for delivery or shifting of materials on site
Consumables – Fuel	Fuel - Diesel for campers, tractor and DG
Permanent Staff & Admin.	Staff salaries & Consultancy fees

Table 5. Notes on revised Project Heads

Main Project	Sub Project	Included Activities
Apple Orchard	--	Main Apple Orchard consisting of 264 trees (<i>R2F - Srinagar</i> consulted)
Apple Orchard	Root Cellar	The long term storage room for keeping a winter supply of fruits that we produce in our orchards and other vegetables
Apple Orchard	Fruit Grove	Formerly known as the 'Apple & Apricot Orchard' – a smaller plantation of fruit trees near to residences
Biofence Plantation	--	Fence line boundary plantation of mostly natives. Our largest plantation area.
Nursery	--	3 nurseries have been set up involve outdoor green shade net areas for plant propagation
Nursery	Greenhouse	Large greenhouses for native plant propagation (currently only 1 is standing)
Nursery	SPV Greenhouse	The solar panel greenhouse - used for some native seed trials and vegetable production
Miyawaki Pilot	--	Established Pilot Plantation consulted by <i>Afforestt</i> (formerly called Miyawaki PP) in 2019 with 2400 plants
Windbreak Plantations	--	Tree lines for wind protection consisting of both native & adapted species
Biomass Production	Animal Husbandry	Formerly known as 'Compost', this consists of the cow shed infrastructure development & maintenance, care of livestock, feed & management
Biomass Production	Composting	Production of biomass on site from manure, leaves, food waste as well as the use of the biogas digester
Landscaping	--	All smaller plantations that don't come under other groupings and consist of native herbs & small shrubs
Commons	--	Permanent staff, administration & consultancies. Watering work including borewell installation & maintenance & tractor maintenance

Table 6. Cost Head-wise Budget for Q2 2020

Cost Head	Totals (Rs)
Capital Expenditure	16,08,761
Labour	8,35,239
Planting Material	11,70,000
Raw Materials	30,000
Materials & Equipment	18,000
Soil Preparation	25,000
Transport	50,000
Consumables – Fuel	30,000
Permanent Staff & Admin	10,50,000
Total	48,17,000

Table 7. Project Head-wise Budget for Q2 2020

Project Head	Totals (Rs)
Apple Orchard – Root Cellar	7,50,000
Apple Orchard – Fruit Grove	18,000
Biofence Plantation	10,54,000
Windbreak Plantation	7,89,000
Nursery	1,59,000
Nursery – Greenhouse	9,67,000
Commons	10,80,000
Total	48,17,000

Conclusion & the Path Ahead

This quarter the Forestation team has been working on solidifying our infrastructure, planting seeds, taking care of all the plantations and liaising with our nursery scheme suppliers. We have also been making plans for the upcoming quarters and next year. In the coming quarter, July to September we will finalise the contract for our greenhouse development, work alongside the HIAL Construction team to create the root cellar and begin preparations for autumn windbreak plantations and next spring's large plantation. We will be continually reviewing our approaches and methods and, in discussion with *Afforestt* – our Miyawaki consultants, will discuss the constraints outlined in this report, and create an actionable roadmap for our future Miyawaki plantations. To meet these goals, we need to increase the productivity of our nurseries and greenhouses so we can propagate the large number of species required to execute Miyawaki plantations. In addition, in the coming quarter, we will work with the help of external experts, on establishing a systematic network of irrigation pipes and drip systems, to ensure the efficiency of staff and labour time and the efficiency of our water in this desert environment.

HIAL and the Forestation team are very proud to be one of the MMT Foundations' star projects and we will strive to meet both our organisations' expectations and goals.