

Silk Road Steppe in Kyrgyzstan



Research trip to Bishkek and the Issyk-Kul region of Kyrgyzstan to find plant species for a Silk Road steppe to be grown in UK

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Introduction:

I work as a Botanical Horticulturist in the Asian Heath garden team at Wakehurst in Sussex. This role has encouraged me to research and learn more about the varied flora of Asian countries. As Wakehurst is managed by RBG Kew there are even more opportunities to carry out research with the backing and support of staff at Kew. This trip was carried out in partnership with staff from the Millennium seed bank at Wakehurst and a team of botanists from the Institute of Biotechnology in Bishkek, Kyrgyzstan.

There is a planned redevelopment of the Asian Heath garden at Wakehurst which will incorporate a representation of the Silk Road Steppe which can be found in central Asian countries such as Kyrgyzstan. I was offered the opportunity to visit Kyrgyzstan to research the flora which could be grown in the new redevelopment.

Aims of trip:

- 1) Research flora of Kyrgyzstan
- 2) Collect seed for conservation in Millennium seed bank and for ornamental use
- 3) Strengthen links with partners in Kyrgyzstan

As you can see there are three main objectives of the trip. Firstly to research the flora in Kyrgyzstan, specifically those which would be suitable for growing in the UK. We created a target species list which was made up of plants suggested by Landscape architects at LDA design who are completing the new redevelopment plan at Wakehurst. This list enabled us to have a more focused search while out in the field.

The team at the Millennium seed bank were excited to join this partnership as it gave them the opportunity to collect more seed for the seedbank. Our aim was to label species and come back later in the year for seed collection, however some species were ready for collecting while we were there so we did collect some species.

Finally we wanted to build up the existing links with the team working in Kyrgyzstan. The partnership between Kyrgyzstan and the Millennium seed bank started 10 years ago and has been continually worked on ever since. It is the most productive and longest running of the Asian partnerships within the seed bank.

I have included a breakdown of the people who made up the team:

- Dr Kate Hardwick- Asian collections coordinator, Millennium seedbank (MSB), Wakehurst
- Maud Verstappen- Botanical Horticulturist, Asian Heath garden, Wakehurst
- Orla Elliston- Botanical Horticulturist, Asian Heath garden, Wakehurst
- Sally Prothero- Landscape architect, LDA design
- Dr Peter Borchardt, Professor at University of Hamburg, Germany
- Ben Jones- Arboretum Curator at Oxford Arboretum, Oxford Botanic Gardens
- Georgy Laskov- Botanist, Institute of Biology and soil science, Bishkek
- Tatyiana- Head of seedbank and fieldwork, Institute of Biotechnology, Bishkek

Itinerary:

June 17th- Depart from London Heathrow airport (Kew team- Kate Hardwick, Sally Prothero, myself and Maud Verstappen)

June 18th- Arrival in Bishkek. Check in to hotel. Dinner with Kew team and Peter Borchardt and Ben Jones.

June 19th- Tour of Institute of Biotechnology, Bishkek and fieldtrip to mountains in the South East of Bishkek

June 20th- Drive to Issyk-Kul region, stop at one site for seed collecting. Check into guesthouse at Kaji-say, south shore of Issyk-Kul

June 21st- Fieldtrip to Barskoon stopping at Barskow Canyon.

June 22nd- Fieldtrip to Ton and the hills above Kaji-say

June 23rd- Return to Bishkek, check back into hotel in Bishkek

June 24th- Tour of Botanic garden in Bishkek, fieldtrip to mountains to South West of Bishkek

June 25th- Check out of the hotel and return flight to Heathrow

Kyrgyzstan:

Kyrgyzstan is a central Asian country which borders Kazakhstan in the North, China to the East, Tajikistan to the South and Uzbekistan to the West. Kyrgyzstan was part of the Soviet Union until they became independent in 1991; they are now a Democratic state with a population of 5.4 million people. The two main languages they speak are Kyrgyz and Russian and the major religions followed are Islam and Christianity.

Kyrgyzstan was once part of the Silk Road trade route; the old city of Osh in the South still holds a bazaar which was once a stop on the Silk Road. In the East of the country there are the Tian Shan Mountains which would have once surrounded the Silk Road.

The climate of Kyrgyzstan varies hugely across the country. The south is very tropical, easily reaching 40°C in summer whereas the North is quite temperate with some areas experiencing temperatures down to -10 °C for much of the winter. There are even some ski resorts on the mountains in the North of Kyrgyzstan. In the North, while we were there, temperatures were between 25°C and 35 °C. The average annual rainfall is 450mm.



Fig. 1- Map of Kyrgyzstan

Diary of trip:

I have not included a diary entry for June 17th, June 18th or June 25th as this was just travelling!

Monday 19th June 2017- Tour of Institute of Biotechnology, Bishkek and fieldtrip to mountains in the South East of Bishkek

After arriving in Bishkek on Sunday morning and having a quiet day to rest after the travelling it was time to get to work! Our hotel was just down the road from the Institute of Biotechnology (IoB) in Bishkek so we walked down to meet the Kyrgyz team and have a tour of the Institute. The IoB has no government funding for fieldwork or laboratory work, the only money they receive from the government is for staff salaries, so all their work is solely supported by International grants.

For a relatively small country Kyrgyzstan has a rich flora of just over 4000 species, 25% of these have already been banked by the Institute of Biotechnology. This means that the Millennium seedbank's partnership with Kyrgyzstan is the longest running and most productive of all their Asian collections collaborations. Made up of three upright freezers, the seedbank at the IoB is fairly basic however it works well for what they need even if it is getting full now! There is also the capability for storing the rarest species in liquid Nitrogen to preserve them better.

Once we had finished the tour of the IoB we headed into the mountains in the South East of Bishkek where we had heard there would be some good meadows.



Fig. 2- The landscape of mountains in the South East of Bishkek

This was our first proper view of the landscape of Kyrgyzstan and it was stunning! The land is fairly flat until you reach the snow capped mountains, this gives an amazing view as the horizon is so distant with huge mountains creating a dramatic backdrop. As soon as you stepped out of the car all you could hear was the sound of hundreds of crickets and grasshoppers; I love this picture of a grasshopper on a *Verbascum* flower which I took in the meadow.



Fig. 3- Grasshopper on *Verbascum songaricum* flower

We found about 20 different species in the first meadow which we visited, some of these were on our collection list and others were different species which I hadn't heard of before. We didn't complete any seed collection at this site as most of the plants were still in flower. There were however a few plants which we labelled up and would like to go back and collect when they will be in seed.

Although we didn't collect any seed on the first day it was still a very good introduction into plant hunting and I felt that I had already learned lots!



Fig. 4- *Allium caesium* in flower

Tuesday 20th June- Drive to Issyk-Kul region

On Tuesday we met up with the whole team at the Institute of Biotechnology to complete the 5 hour drive to the Issyk-Kul region, in the North east of Kyrgyzstan. I have previously mentioned everyone in the team before so I will just say that Ben, Peter, Georgy and Kate were in one car and the rest of us went in the other car, we kept it this way for the whole of the trip.

Our drivers were more used to driving tourists so hadn't quite got used to the idea that we might stop suddenly along the road if we spotted a plant of interest. This meant that at one point Georgy spotted something and their car stopped while we carried on. After waiting at a petrol station for about half an hour we got a phone call from the others to say that they had started seed collecting and we should go back and join them!

I'm not sure exactly where along the road we had stopped but our driver said it was near a place called 'Kök-Mynok echi'. It was a very dry, rocky area with high mountains around it, the river Chu ran through the valley and it was close to the border with Kazakstan. After a quick lunch we joined the others seed collecting. This was my first experience doing seed collecting and also with filling out data collection sheets.



Fig. 5- The valley where we stopped for first seed collection

By the time we had arrived the other members of the team had already collected species of *Stipa* and *Gonoilimon*. But we spent another hour collecting *Helianthemum songaricum* seeds. After that it was time to get back on the road for the rest of the journey to Issyk-Kul.



Fig. 6- (Left) my first seed collection

Fig. 7- (Above) One of the cars loaded up with equipment

Fig. 8- (Below) Kate holding some of the seeds collected



After about three more hours driving we arrived at our guesthouse in Kaji-say which is on the South side of Lake Issyk-kul. We checked into a lovely family run guesthouse which had lots of outside space with swing seats and a very fragrant Honeysuckle growing up one of the buildings. It was a peaceful place to relax after a long drive down!



Fig. 9- (Left) Honeysuckle growing up the balcony at the guesthouse

Fig. 10- (Right) Outside seating area at the guesthouse in Kaji-say

Wednesday 21st June 2017- Waterfalls and mountains

Our plan on Wednesday was to make an hour drive to the East of Kaji-say to a town called Barksoon with a few stops along the way. Our first stop was about 15 minutes into the drive down by the lake. This was a very flat, dry, desert area where we recorded information on a few different plant species.

Next we stopped up on the mountain pass at a place called Barksow canyon, it was very beautiful with a river running through the valley. We found lots of our target species and I filled out my first ever data sheet which was for a *Geranium saxatile*.



Fig. 11- The Mountain pass by Barksow Canyon

After filling out the data sheets at the Canyon we travelled further up the mountain pass to stop for lunch by a waterfall. At the bottom of the path up to the waterfall, there was a small community of Nomadic Kyrgyz people who were living in Yurts for the summer, whilst their animals were grazing on the mountain. We walked for about 20 minutes through a pine forest to reach the top of the waterfall, along the way we found a few interesting plant species.

Our final stop of the day was further up the mountain on the road to the Kumtor gold mine. At this point we were very close to the border with China so we had to go through a police checkpoint before we were allowed to go on the road up the mountain. When we reached our stopping point near the top there was another nomadic family who were just bringing their sheep in for the night. We missed out on the chance to have a Kyrgyz delicacy which is fermented horse milk, as the family had run out! On that bit of mountain we found *Erigeron auranticus*, *Erigeron allochous* and *Phlomis urophylla* which we were looking for, as well as other species which were not target species.

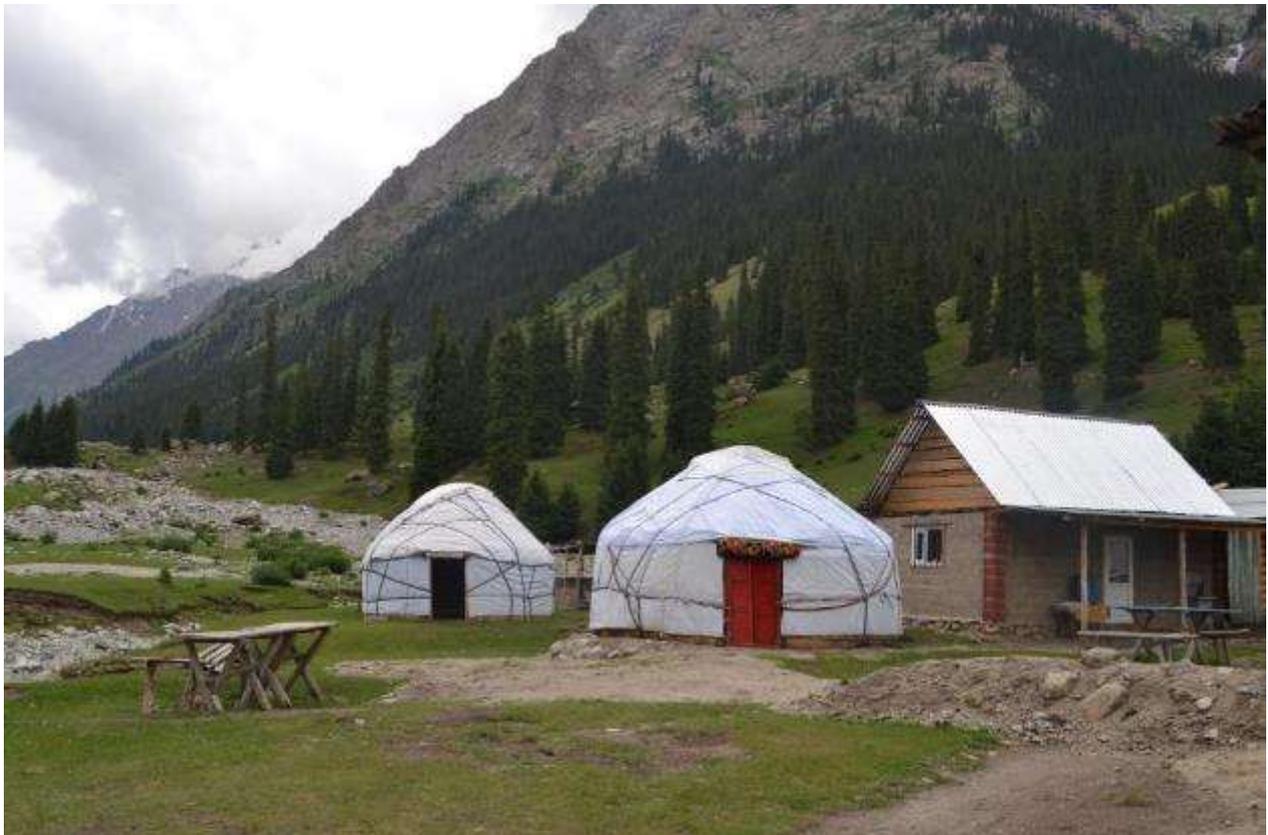


Fig. 12- (Above) *Aquilegia* sp. By the waterfall



Fig. 13- (Right) The waterfall

Fig. 14- (Below) Yurts on the mountain



It had actually been quite chilly on the mountains, down to about 18°C. When you are getting used to temperatures in the high 20's, that feels cold, so it was good to get off the mountains where it was a bit warmer again. So after a long day up on the mountains we decided to go down to the shore of Lake Issyk-Kul where we watched a beautiful sunset. The lake is 60km across at its widest point which meant that the mountains on the other side looked so far away. This made the sky seem huge which created space for one of the most beautiful sunsets I've ever seen!



Fig. 15- Beautiful sunset across Lake Issyk-Kul

Fig. 16- Me admiring the waterfall

Fig. 17- The river bed



Thursday 22nd June- The spectacular dried-up riverbed

Thursday's plan was to drive to a town called Ton where we thought there would be some of our target species. On the way we stopped off at this amazing dried-up river bed which is popular with tourists in summer but in spring would have a river running through it. You can walk right through this river bed, it has a sandy base and rocky walls which if you climb to the top provide breath-taking views of the mountains surrounding it.



Fig. 18- Dried up river bed near Ton

As the aim of this trip was research rather than seed collecting we were expecting most of the plants to still be in flower and not ready for collection. So it was no surprise that the plants were not ready for seed collection, it just gave us the opportunity to see the plants in flower. Some of the species we found include: *Clematis songaricum*, *Limonium kaschgaricum*, *elegans*, *Acanthalimon alataricum* and *Anabasis tianschanica*.

It was strange to think that during spring, there would be a river running through the area which we were walking through looking at plants in summer. As you can see from the image above, the area was dry and sandy with only the plants as any colour in the image. It was spectacular; I've never seen anything quite like it. My favourite part was climbing to the top of the river walls where all you could see for miles was mountains. When you looked to the North you could see a strip of Lake Issyk-Kul between the hills. After climbing back down and walking back the way we'd come we eventually found the cars and decided to stop for lunch before moving on.

We stopped at a few more places along the road which were all flat, dry areas on the shore of the lake where we did record a few species but didn't collect any seed. We finished up in the mountains just above Kaji-say where we collected some *Stipa* seeds. We also found *Serratula latifolia*, *Rinactinidia limonifolia*, *Dracocephelum integrefolia* and *Feretula trancilliansis*. After that we went back to the guesthouse for dinner.



Fig. 19- The view from the top of the river bed

Fig. 20- Our lunch spot at the end of the river bed



Friday 23rd June 2017- Drive back to Bishkek

We started the morning by sorting out and labelling all our seed collections before we had to transport them back to Bishkek. Our four seed collections were: *Helianthemum*, *Stipa*, *Dracocephelum* and *Ephedra*. This involved wrapping, bagging and labelling up the collections with the name and voucher number. The voucher number is a unique number for each data collection which tells you the trip location, date and collector's ID, this is used to identify the individual collections and link them to their data sheets. Once we had sorted the seeds it was time to check out of the guesthouse and drive back to Bishkek.

The weather was much warmer than some of the other days, reaching to above 30°C which was not very pleasant for riding in a hot car for 5 hours; luckily we had air conditioning though so it wasn't unbearable! We ended up driving through a market on the outskirts of Bishkek which was very interesting as you got to see all the people busily buying and selling various products, it seemed a very well set up and popular market.

By early afternoon we had arrived back in Bishkek, just as a storm was brewing up in the mountains. We had planned to go and look at the meadows in the south of Bishkek but could see that the storm had already hit the mountains so we decided to stay in Bishkek.

Whilst Kate was sorting out plans for future seed collecting we had the job of sorting out the seeds, data sheets and herbarium specimens. As we had already labelled the seeds using the voucher number from the data sheets that morning all we had to do was label the corresponding herbarium specimen with the same voucher number. We also labelled each seed collection and herbarium specimen with consecutive numbers using the Kyrgyz team's numbering system so they would be able to easily identify the new collections. We then handed the seeds and herbarium specimens over to the team at the Institute of Biotechnology who would ensure they were correctly identified, clean the seeds and store half of the seeds. The remaining seeds and one of the herbarium specimens (for each species) will be sent to the Millennium seedbank at Wakehurst for storage there as well.

Before leaving the institute of Biotechnology we had another chance to look round and saw the seedbank again. After that, we checked back into our hotel in Bishkek and went out for dinner. It was amazing how quickly the weather changed from a hot day into a wet, stormy afternoon. The walk to the restaurant for dinner was interesting with dust blowing around everywhere and a few large branches falling off trees, later on in the evening there was a power cut too. Luckily we were all safe and made it back to the hotel after our dinner!



Fig. 21- Myself filling out a data sheet



Fig. 22- (Above) National academy of Sciences building (Institute of Biotechnology occupies one floor of the building)



Fig. 23- (Above right) An example of a herbarium specimen for *Centaurea* sp.

Fig. 24- One of the staff at IoB showing us the work they do



Saturday 24th June 2017- Botanic garden and meadows

As we had officially finished all our data collection and research, Saturday was our day off before returning home on Sunday. We had been invited by the Director of the Botanic garden in Bishkek for a tour of the garden. The Botanic garden was built in 1938 on two separate sites in Bishkek, the smaller site which is more in the centre of Bishkek has now been divided by a road through the middle, and the larger site is on the outskirts of Bishkek.

We met the director at the smaller site and started on the side of the road which includes more herbaceous plants and meadows. We were given a tour of that part of the garden by two of the garden staff who were very knowledgeable and enthusiastic. Many of the plants were just starting to go over, such as the Alliums, at first I was disappointed by this but then I realised that the seed heads created a beautiful structure which is not noticed as much when the plants are in full flower. The meadow areas of the garden included some interesting species of *Eremurus* and *Achillea* as well as *Verbascum songaricum*, *Allium altissima* and lots of other species. Unfortunately they had quite a few species which are not native to Kyrgyzstan so although very beautiful they would not be very useful from a collection point of view.

We continued our tour by viewing the very overgrown but beautiful glasshouse which had a wide range of plants from cacti and succulents to large trees. We have managed to secure funding for one of the members of staff at the Botanic garden to come to Wakehurst for a few weeks to help us with propagating the plants for the redevelopment. This is very exciting as it allows us to continue sharing knowledge and skills and also will help us to strengthen our links with horticulturalists in Kyrgyzstan.



Fig. 25- The glasshouse at the Botanic garden



Fig. 26- (Above left) A seedhead of *Allium altissima*

Fig. 27- (Above right) *Populus sp.* in the Botanic gardens arboretum

Fig. 28- (Below) Sunshine in the glasshouse



After viewing the glasshouse we crossed the road to see the rest of the site. This section is an arboretum which is organised into different regions of the world. For example they had a section for Native Kyrgyz trees and then an area for American trees etc. The Arboretum manager didn't know much English but her plant knowledge was impressive and she very enthusiastically showed us most of the trees in the arboretum. We were mostly interested in the Kyrgyzstan section; it was good to see plants we had seen growing in the wild planted in the arboretum. Once we had finished our tour of the arboretum we drove across town to visit the larger site of the botanic garden.

Now it was time for the tour by the Director of the Botanic garden, he didn't speak much English but one of the staff from the Institute of Biotechnology was translating for us. The main site of the botanic garden is currently being redeveloped so there wasn't a lot to see however it was good to hear their plans. We went into the main building where one Sunday a month they hold an exhibition about different subjects. One example of the type of exhibition they have is in autumn they exhibit different fruits and explain to people how to identify them and about the trees they grow on. The director said that the exhibitions were very well attended. I really liked the idea of these exhibitions as they are all about educating the public about plants and botany which I think is very important.

We finished our tour of the botanic garden and stopped off at a street vendor to buy freshly made bread and pies similar to Cornish pasties for lunch. We drove up to the mountains in the South West of Bishkek where we had wanted to go on Friday. There was an amazing view of Bishkek laid out below us as we ate our lunch on the mountain. We spent about an hour at one meadow which had almost gone over but still had some good flowering species including: *Eremurus*, *Achillea* and *Centaurea*.

We drove for another half an hour to a different site which was higher up in the mountains right near a ski resort. This part wasn't really a meadow but there were a few interesting species growing along the side of the road. The views up on the mountains were amazing; you could see the twisting road heading down the mountain framed by fields of crops including the bright yellow of rapeseed crop which stood out against the tarmac road. The stormy sky was creating a beautiful backdrop to the snow capped mountains. After spending a while up on the mountains looking for more species it was time to head back into Bishkek.

Back in Bishkek we said our goodbyes to everyone at the institute; they very kindly gave us two books that they had produced about the native plants of Kyrgyzstan. I decided to get an early night as we had to get up at 3.45am for our flight back home!



Fig. 29- The Mountains around the South West of Bishkek

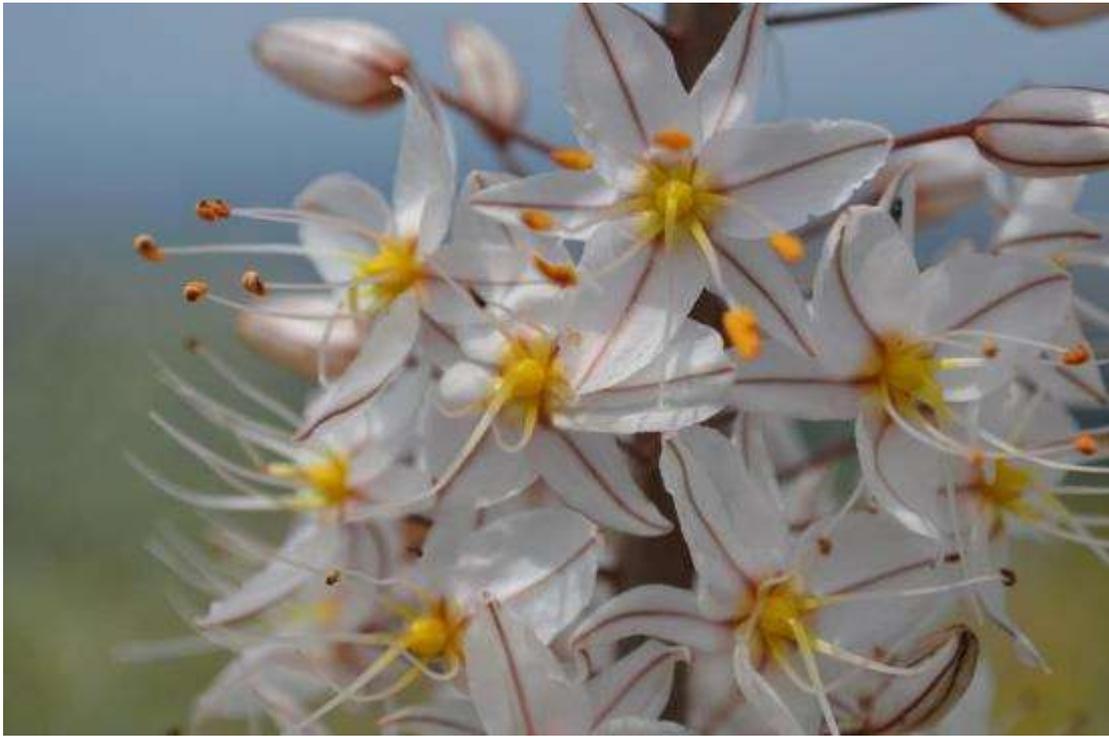


Fig. 30- (Above) *Eremurus* sp. at the first meadow

Fig. 31- (First left) the view of Bishkek from on the mountain

Fig. 32- (Second left) The ski resort on the second mountain



Conclusion-

This trip was a success as we managed to find many of our target species which we have now recorded data for. This means we will be able to go back to collect seed another year. The seed collection which we completed was an added bonus as it wasn't a guarantee that there would be any species available to collect when we went. We also strengthened relationships with both English and Kyrgyz partners which we hope to keep up in the future for more collaborative projects.

I also really enjoyed experiencing a new culture, language and cuisine. Kyrgyzstan is a country which many people haven't heard of let alone visited so it has been great to tell other people about this beautiful country which I got to visit.

But most importantly for me, the trip has increased my enthusiasm for studying new and interesting plants as well as giving me an amazing experience which I will never forget. Personally I feel that the experience I had has improved my confidence both in meeting new people and in identifying plants and seed collection techniques. The chance to spend a week with like-minded people all with varied and interesting backgrounds was great and I would be the first to volunteer if another opportunity came up!

Acknowledgements-

Most importantly thank you to The Merlin Trust for their very generous grant, without which the trip would not have been possible.

I would like to thank Kate Hardwick for doing most of the planning for the trip, also thank you to everyone I went on the trip with for being great company while we were away. To the two drivers we had in Kyrgyzstan thank you for your patience when we kept stopping to look for plants and for your insight into the culture of Kyrgyzstan.

Finally, I would also like to thank all my colleagues at Wakehurst for the encouragement before, during and after the trip; I greatly appreciate all your support. Special thanks to Ed Ikin for inviting me to go on the trip, without your input I don't think the trip would ever have happened!



Fig. 33- *Aster vvedenskyi*

Budget breakdown-

Grant amount received- £1500

- Air fare (Return journey Heathrow to Bishkek) – £394.87
- Car hire for five days- £ 786.10
- Fuel for hire car- £184.10
- Bugu Hotel in Bishkek for four nights- £210.00
- Guesthouse in Kaji-say for three nights- £36.68

Total spend- £1611.75 (All grant used, none returned to Merlin Trust)



Fig. 34- Crop fields with mountains in the background