“Growing Together”

Challenging perceptions of food production

Consultants’ project report
February 2014

Project title: Growing Together
Project partners: IPCRI
Project funding: Osprey foundation
Project dates: October 2013 – May 2014
Project budget: US$ 30,000
Byspokes implementation team: Lorena Viladomat and Philip Jones
1. Executive summary

Byspokes, in partnership with the Israel/Palestine Center for Research and Information (IPCRI) and with funding from the Osprey foundation, has implemented a project to introduce water-efficient food production systems in two communities identified as being disproportionately impacted by the regional conflict (one in Israel, one in Palestine). During this 8-month pilot project (titled “Growing Together”), demonstrations of three different, water and space efficient farming techniques – a wicking bed, a hydroponic system and an aquaponic system – were constructed in a host centre within each community. Project interns and staff at each centre received training in construction and management of the installed systems. Subsequently, in close collaboration with IPCRI project interns, a series of public outreach events were held at each centre in order to introduce these agricultural methods to the wider communities. The public outreach events were themed to different aspects of sustainable urban and desert food production, and included lectures from local and international experts, opportunities for discussion, markets of local produce and, of course, explanations and guided tours of the farming systems on show.

The primary focus of the farming systems constructed during this project was that they serve as demonstrations of the technologies to members of nearby communities (rather than being focussed on food production per se). As such, the project assessment focuses more on public perceptions and interest generation within the communities rather than food production in absolute terms. However, food produced by the systems of course provides an additional benefit for host centres, and in order for the systems to be perceived worthwhile by community members then it is important that food production potential is observed.

The project suffered a few minor setbacks initially and during the implementation stage, which resulted in delaying the project start by around one month, and extending the practical implementation stage by around one month. However, the impacts of the delays were mitigated during project implementation, and overall the project was completed within the anticipated timeframe, having completed all the proposed milestones.

In general it is felt that this project has thus far been successful. It is obvious that the systems have already caught the attention of visitors to the two project sites, with members of the local communities regularly dropping in to check on progress, or to see what is actually going on, after hearing something about the project. Also, owing to the systems’ prominent location within each site, casual visitors to the host centres notice the systems and invariably stop to ask for more information. Now that the host centre staff and interns have become comfortable managing the systems, and the growing season has commenced, the systems have started to produce crops vigorously, and the level of community interest is expected to increase. These are a very encouraging signs showing that each project site has great potential for passive awareness building with regard to the farming techniques on display. This passive awareness building coupled with the more active approach of bringing people together on workshop and open days will ensure that the project has the widest reach possible, which in turn will pave the way for future spread of these types of food producing systems within the targeted communities.
2. Project introduction

Byspokes, in partnership with the Israel/Palestine Center for Research and Information (IPCRI) and with funding from the Osprey foundation, has implemented a project to introduce water-efficient food production systems in two communities identified as being disproportionately impacted by the regional conflict (one in Israel, one in Palestine). This 8-month pilot project (titled “Growing Together”) aimed to construct demonstrations of three different, water and space efficient farming techniques – a wicking bed, a hydroponic system and an aquaponic system – in a host centre within each community, and then to facilitate the host centre becoming a local “hub” for knowledge sharing and outreach to help foment interest in the wider use of these systems within the selected communities.

Public workshops, hands on training activities and open access to the farming systems aimed to build the capacity of the host communities to manage such farming systems to produce nutritious organic vegetables, fruit and fish while conserving water and land, and also to raise regional awareness of sustainable food and water practices.

The overall objective of the “Growing Together” project is to enhance local food security and improve livelihoods in rural communities in Israel and the Palestinian Territories of the West Bank, while providing opportunities for people of all backgrounds to work and learn together.

Full training in system operation and maintenance was provided to local youth interns (2 per site) and centre staff, to encourage personal investment and ensure on-site capacity. Hands-on training, workshops and community events around the sustainable food production theme were incorporated into the project to build interest in and awareness of small-scale sustainable food technologies. Workshops took place on-site in the host communities, bringing together participants with an interest in sustainable domestic food production. Palestinian, Israeli and international experts in the fields of permaculture, sustainable urban agriculture and aquaponics delivered components of the outreach programmes.

In the long term, it is hoped that the systems will remain operational and the centers are equipped to deliver more workshops into the future. It is hoped that these activities will generate wider interest in aquaponic and hydroponic technologies, potentially leading to more widespread implementation.
3. Proposed project activities

Total project duration: 8 months
Proposed timeframe: August 2013 - March 2014
Actual timeframe: October 2013 – May 2014

Phase I: Initial construction and training period, led by Byspokes.
Proposed timeframe: August 2013 – October 2013 (2.5 months)
Actual timeframe: October 2013 – February 2014 (4.5 months)

Phase I proposed milestones:
• Recruitment of youth interns (2 per site)
• Purchase and preparation of system materials
• Assembly of community food systems (2 sites; 3 systems per site)
• 2-day training for community centre management and members
• 5 public workshops: 2 at each site; 1 joint workshop to be hosted in Jerusalem for the interested public

Phase II: On-going support and local capacity building, led by IPCRI and “Growing Together” interns.
Proposed timeframe: October 2013 – March 2014 (5.5 months)
Actual timeframe: February 2014 – May 2014 (3.5 months)

Phase II proposed milestones:
• On-going support and local capacity building, led by IPCRI and “Growing Together” interns
• Regular site visits by local interns; harvesting, sharing and potential selling of produce
• Project monitoring and evaluation
• Public workshops and lively community educational events (2 per site)

4. Project implementation summary

During Phase I of the project, Byspokes took responsibility for implementing the technical stages of the project plan, such that IPCRI and interns within the host centres would be able to take on Phase II activities independently. The project activities conducted at each site are detailed in table 1. A major component of the project was community outreach and education, and for this reason several workshop days were included in both phases of the original proposal. During project implementation some overlap and lack of thorough definition between proposed outreach and educational events was noted, and so to simplify and clarify the outreach components the various events were re-defined:

Initial proposal: Two-day centre participant training at each site (Phase I); five public workshops (two at each site and one in Jerusalem) (Phase I); two public workshops at each site (Phase II) - total 6 events per site, and one in Jerusalem.

Implementation plan: Three training workshops at each site, specific to the farming systems (open to project participants and the public) (Phase I). Three public open days at each site, with a programme of talks to be delivered by experts in various sustainable activities in Palestine and Israel (Phases I and II) – total 6 events per site.
Table 1: Summary of project activities conducted at each site

<table>
<thead>
<tr>
<th>Activity</th>
<th>Observations</th>
<th>Beit Sahour</th>
<th>Tel Sheva</th>
<th>Execution date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of site</td>
<td>Several visits were made by Byspokes and IPCRI representatives to potential project sites in the West Bank and Negev desert to assess their suitability. This process took around one month, with the final sites selected being the “Bethlehem Study Centre” in Beit Sahour, and “Desert Daughter” in Tel Sheva.</td>
<td></td>
<td></td>
<td>04/11/2013 06/11/2014</td>
</tr>
<tr>
<td>Selection of local interns</td>
<td>Host centres were largely responsible for selecting project interns. Byspokes met with potential interns prior to confirming their involvement with the project. The initial project proposal called for an IPCRI intern to follow the whole project, and thus also build capacity within IPCRI. However, for various reasons the original IPCRI intern had to leave during the middle of the project, and a replacement has been found who will follow the project to completion.</td>
<td></td>
<td></td>
<td>19/11/2013 12/11/2013</td>
</tr>
<tr>
<td>System design completion</td>
<td>3 systems were designed for each site: a wicking bed, vertical hydroponic system and an aquaponic system. Systems were designed taking host centres’ preferences into account, and to be as similar as possible between sites to allow for better long-term comparisons.</td>
<td></td>
<td></td>
<td>13/11/2013 19/11/2013</td>
</tr>
<tr>
<td>Procurement of major materials completed</td>
<td>Materials were primarily sourced from five major suppliers in the West Bank and Negev. The selected suppliers have proven to be the most economical and efficient in previous projects implemented by Byspokes.</td>
<td></td>
<td></td>
<td>02/12/2013 10/12/2013</td>
</tr>
<tr>
<td>Start system construction</td>
<td>In each site, system construction commenced the moment the bulk of the materials were present at the site.</td>
<td></td>
<td></td>
<td>02/12/2013 10/12/2013</td>
</tr>
<tr>
<td>First training workshop</td>
<td>Training workshops were primarily targeted at host centre interns and staff, although the intention was always that workshops would be open to anyone interested to attend. Topics for the first workshop were: • Setting the scene – project background • Exploring wicking beds, hydroponic and aquaponic systems • Introduction to plants and plant management In each site, only host centre staff and interns attended the first training workshop.</td>
<td></td>
<td></td>
<td>01/12/2013 28/11/2013</td>
</tr>
</tbody>
</table>
## Second training workshop

Topics for the second training workshop were:
- Water quality (parts 1 and 2)
- Plant health and nutrition
- Plant management

In Beit Sahour, only host centre staff and project interns attended the second workshop. In Tel Sheva, a group of five women from the nearby community of Lakiya attended the second workshop alongside the Tel Sheva project participants.

<table>
<thead>
<tr>
<th>Date</th>
<th>Hydroponic</th>
<th>Wicking bed</th>
<th>Aquaponic</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/12/2013</td>
<td>19/12/2013</td>
<td>19/12/2013</td>
<td>19/01/2014</td>
</tr>
</tbody>
</table>

## System construction completed

The different farming systems were completed on different dates, resulting from the different time required to construct each system. Host centre staff and interns at each site participated in various stages of construction of each system in order that they gain a better understanding of how the systems work.

<table>
<thead>
<tr>
<th>Date</th>
<th>System</th>
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<tbody>
<tr>
<td>06/12/2013</td>
<td>Hydroponic</td>
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<tr>
<td>10/12/2013</td>
<td>Hydroponic</td>
</tr>
<tr>
<td>19/12/2013</td>
<td>Wicking bed</td>
</tr>
<tr>
<td>17/12/2013</td>
<td>Wicking bed</td>
</tr>
<tr>
<td>19/01/2014</td>
<td>Aquaponic</td>
</tr>
</tbody>
</table>

## Third training workshop

Topics for the third training workshop were:
- Introducing fish
- Fish health
- Fish management
- System design
- Operation and management of systems

In Beit Sahour, only host centre staff and project interns attended the third workshop. In Tel Sheva, a group of five women from the nearby community of Lakiya attended the third workshop alongside the Tel Sheva project participants.

<table>
<thead>
<tr>
<th>Date</th>
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<tbody>
<tr>
<td>15/12/2013</td>
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<tr>
<td>22/01/2014</td>
</tr>
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</table>

## First public open day

The first public open day in Beit Sahour was organised, publicised and managed by Byspokes together with the host centre interns. This open day targeted leaders of local and community organisations in the Bethlehem area to form a link between them and the project, and project interns. In this way, project interns and IPCRI have access to a network of community representatives who may be able to bring interested groups to subsequent open days. Attendance was 7 people (not including those directly involved with the project).

In Tel Sheva, the first public open day was organised and managed by Byspokes along with the host centre interns, with the bulk of publicity being managed by the host centre. Guests, predominately women, came from the nearby communities of Tel Sheva, Lakiya and Um Batim. Peak attendance was 18, of
<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>System stocking completed (plants and fish)</td>
<td>Owing to the cool weather, the bacterial growth in aquaponic systems was slower than anticipated, which delayed fish stocking. Systems were planted two to three weeks before the fish were stocked.</td>
<td>24/02/2014</td>
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</tr>
<tr>
<td>Second public open day</td>
<td>The second public open day held in Beit Sahour was organised and managed by Byspokes alongside the host centre and IPCRI interns. Publicity was left primarily in the hands of project interns, with Byspokes preparing relevant materials. Peak attendance was 14, of which 10 were from the local community.</td>
<td>20/01/2014</td>
<td>TBA</td>
</tr>
<tr>
<td>Third public open day</td>
<td>The third open day at the Bethlehem Study Centre was organised and managed entirely by IPCRI project interns and the host centre. The open day incorporated a number of local speakers and a lively farmers market, and was well attended by guests from the local community.</td>
<td>08/03/2014</td>
<td>TBA</td>
</tr>
<tr>
<td>Project monitoring</td>
<td>A Google group and Google drive folder was set up on the initiative of the Beit Sahour project site to facilitate long-term monitoring, and communication between project sites in Beit Sahour and Tel Sheva. The drive contains all relevant documentation, and also spreadsheets in which key project evaluation data are recorded regularly – system water quality, production, site visitor questionnaire answers etc. Until the project close at the end of May 2014, representatives from IPCRI should make 1-2 visits per month to each project site to provide follow up, on-site monitoring and to coordinate the outstanding public open days.</td>
<td>On going</td>
<td></td>
</tr>
<tr>
<td>Project evaluation</td>
<td>Based on the long-term data collected in the project Google drive, Byspokes and IPCRI will be able to evaluate the project and develop appropriate follow on activities once this project has come to a close. Primary evaluation indicators are:</td>
<td>On going</td>
<td></td>
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<tr>
<td></td>
<td>• Number of casual visitors to each site.</td>
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<td></td>
<td>• Number of workshop and open day attendees at each site.</td>
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<tr>
<td></td>
<td>• Input consumption and output production of each system.</td>
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<tr>
<td></td>
<td>• Qualitative feedback of site visitors collected in questionnaires</td>
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</tbody>
</table>
5. Project implementation comments and lessons learned

The project suffered several delays during its implementation, which drew out the period of Byspokes involvement from 2.5 to 4.5 months. One of the initial setbacks was the difficulty in finding a suitable host centre in the West Bank, as the originally identified partner pulled out at the last minute. The reason for this pull-out was that the board of directors of the centre could ultimately not accept a project implemented in collaboration with IPCRI, as IPCRI is an organisation which in many projects strives to build bridges between Palestinian and Israeli communities, and thus is perceived as a “normalisation” organisation by many in the West Bank. Unfortunately, the highly politicised environment of the West Bank can frequently present an obstacle to the implementation of projects – even those with no inherent, potentially controversial component such as this one. This political problem was, for obvious reasons, not an issue in the Negev. However, the project site still changed at the last minute from the originally planned site to the current site. The reason for this change was that the originally planned host organisation was having problems within the host centre community, and so they suggested the current location as a suitable alternative. Once the sites had been confirmed, project implementation ran relatively as planned, although unforeseen financial policy changes in the U.S. caused a slight delay in materials procurement by severely complicating the process of making funds in IPCRI’s US account locally available for the project.

An aquaponic system cannot be stocked with fish until the biological filtration system is functioning correctly. Biological filtration is a bacterial process, and so it is necessary to grow the correct bacterial communities within the filter. The process of growing bacterial communities, and thus preparing the filter for fish, is called cycling. Cycling takes time, and takes significantly longer in colder weather than in hot weather – up to 8 weeks instead of around two weeks. This means that it is almost impossible to “make up” for any pre-cycling delays during implementation of a project with an aquaponic component. Any aspects of an aquaponic project that depend on fully stocking the system with fish and plants can only occur once cycling has completed, and cycling can only commence once sites are selected and systems constructed. This project was designed to allow sufficient time for winter cycling in the local climate, however no leeway for pre-cycling implementation delays was factored in to the original project plan. Considering the likelihood of unforeseen delays during project implementation it would be sensible to factor them in to future project plans from the outset – especially if cycling is likely to occur in cold conditions.

The original project plan called for one intern within IPCRI to follow the project for the whole duration. This intern was to participate as much as possible in practical activities and trainings, as well as take charge of project facilitation issues such as workshop publicity and coordination, and generally be a liaison between host centres and IPCRI. At the end of the project this intern would have gained significant experience on the administrative aspects of project implementation, as well as on the practical and technical aspects of aquaponic, hydroponic and wicking bed systems. This intern would then be well prepared for working as a project manager on subsequent similar projects, and even have sufficient background knowledge to be able to start preparing project proposals for follow-on projects – an obvious advantage for IPCRI. Unfortunately, the intern assigned to the project within IPCRI had to leave prematurely, breaking continuity in the project and reducing the potential for internal capacity building. This situation could perhaps have been avoided by allowing time for a more rigorous intern application and selection process, and/or incorporating a moderate amount of financial compensation for the intern into the initial project budget. Offering a stipend could incentivise their commitment in a more immediately tangible manner than the premise of enhanced future employment potential as a result of skills and experience gained by participation.
One of the interns from the Beit Sahour site was offered a great job opportunity part way through the project. Since accepting the job she has had much less time available to spend on the project. This is unfortunate for the project as it places a greater burden on the remaining project intern and centre staff, but of course an excellent opportunity for the individual concerned, who must only be congratulated for her success. Obviously, if a youth intern has to choose between full time employment and part time unpaid involvement in a project such as this, we would have to encourage the former. However, this raises the question of how to ensure sufficient intern participation in any future project. Options could include allowing time for a more rigorous intern selection process, selecting interns that have a greater personal connection with the site, increasing the number of interns, scheduling activities such that they would not coincide with other work or education activities (which becomes increasingly complex with larger numbers of interns) and offering financial compensation. Also, it is worth pointing out that the Bethlehem Study Centre in Beit Sahour is a very new enterprise; as such, the “Growing Together” project is the first activity conducted at the centre. It could be assumed that working with longer established centres could be beneficial in ensuring longer term intern involvement, as the centre would have had far longer to build relationships with potential interns from the community, and their presence at the site would potentially already be a more normal part of their daily/weekly routine – such as is the case in Desert daughter in Tel Sheva.

The project budget was divided into broad categories (primarily: materials; transport; training events; workshop events, and salaries). During project implementation every effort was made to remain within the limits for each budget line, although the Osprey Foundation as project funder understood the constraints of project development and allowed for a little flexibility in spending. In constructing and stocking all the systems at each site Byspokes spent exactly the budgeted amount. However, there was a significant overspend on transport, with the final expenditure a little over double the budgeted amount. One of the contributing factors to this is that 50% of the allotted transport budget was spent before the project even started in earnest – a result of having to visit new potential project sites after the original candidates pulled out. Also, in writing the original project proposal the number of trips necessary to each project site was slightly underestimated, a factor which gains significance considering the Tel Sheva site necessitated a 200km round trip for each visit. As a consequence of overspending in the transport budget, the total available for training and outreach was slightly reduced. However, this does not seem to have presented a problem as engaging public workshops have been held in each site, each with a number of guest speakers, and the event costs have remained comfortably within the reduced budget allocation.

From a technical implementation aspect, this project highlighted a few issues to be aware of in future projects:

- The vertical hydroponic system has a fairly small nutrient reservoir in the design used in this project. This necessitates regular (daily) checking of the water depth and topping up in order to prevent the pump running dry. In a future design it would be prudent to increase the size of the reservoir such that a ballcock cold be fitted inside, thus allowing water level to top up automatically.
- The vertical hydroponic system is very susceptible to wind – especially when the plants are small. Moderate winds can move the plant seedlings such that their roots are no longer in the stream of water. This can be mitigated by putting a small amount of growing medium such as tuff rock in the base of the net cups to hold the plant roots in position.
- The vertical hydroponic system can be prone to leaking from the planting holes. If the pipes are angled slightly backwards (so that the water flows down the back wall of the pipes), this problem can be solved.
• Wicking beds are by far the easiest of the systems to construct and manage. However, if creating an “L” shaped wicking bed then it is impossible to install a one-piece liner without cutting it. This means that there is an inherent weakness in the liner, and any cuts must be sealed carefully to prevent leakage.

In general it is felt that this project has thus far been successful. It is obvious that the systems have already caught the attention of visitors to the two project sites, with members of the local communities regularly dropping in to check on progress, or to see what is actually going on, after hearing something about the project. Also, owing to the systems’ prominent location within each site, casual visitors to the host centres notice the systems and invariably stop to ask for more information. If the systems are managed well, and start to produce crops vigorously, then the level of community interest will increase. These are a very encouraging signs showing that each project site has great potential for passive awareness building with regard to the farming techniques on display. This passive awareness building coupled with the more active approach of bringing people together on workshop and open days will ensure that the project has the widest reach possible.

In order to get a more accurate picture of the potential community impact of this project, and to assess interest within the local communities with a view to the development of a follow-up project, two questionnaires have been prepared for visitors to the centres. One questionnaire is targeted to visitors attending open days, and one targeted to casual visitors to the sites. The Google drive set up for the project enables the long term monitoring of not only questionnaire responses, but also of other data collected during the project, such as water quality, input consumption and crop production. It is hoped that the systems continue to generate interest within the communities, and that by the end of May sufficient data will have been collected to enable a thorough evaluation to be conducted.

6. Acknowledgements

Byspokes would like to thank the Osprey Foundation for the generous financial support, which made this project possible, and the Israel Palestine Centre for Research and Information (IPCRI) for facilitating the project. We would also like to thank Miriam abu Rogaig and Daniel Bannoura of Desert Daughter and the Bethlehem Study Centre respectively, and all the project participants, particularly the interns at host centres. The practical project work was made a lot easier thanks to a number of volunteers who kindly offered the time and labour at various stages of the project.
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Sustainable agriculture and resource management

7. Annexes

The following project documents are appended to this report:

1. System design sketches
2. Calendar of activities – Bethlehem Study Centre
3. Calendar of activities – Tel Sheva
4. Systems maintenance tasks
5. Plant management
6. Troubleshooting
7. Suppliers directory (Bet Sahour)
8. Recording sheet – aquaponic
9. Recording sheet – hydroponic
10. Recording sheet – wicking bed
11. Recording sheet – plants
12. Open day questionnaire
13. Open day questionnaire (Arabic)
14. Visitors questionnaire
15. Visitors questionnaire (Arabic)
16. Open day schedule – Bet Sahour
17. Open day schedule – Tel Sheva
Byspokes
Sustainable agriculture and resource management

Bethlehem Study Centre – site design.

1. Overview of the site showing aquaponic system in the entrance area.

2. Detail of wicking bed (left) and hydroponic system (right) in their planned locations at the Bethlehem Study Centre.
Desert Daughter – site design.

Overview of the three farming systems planned at Desert Daughter. The aquaponic system (left and back) and hydroponic system (right) create a small open space for visitors. The wicking beds are located behind the aquaponic system.
Calendar of Activities for Bethlehem Study Centre Site

Sunday Workshops
These workshops are delivered by Byspokes to interns of Bethlehem study centre

Workshop 1: Sunday 1 December at 4:00pm @ Bethlehem Study Centre

1. **Setting the scene:** Current global food production systems and the need for sustainable farming.

2. **Exploring 3 agricultural techniques:** An overview of aquaponic, hydroponic and wicking bed systems. Pros, cons, components, versatility and domestic economics.

3. **Introduction to plants:** Anatomy, life cycles and reproductive strategies of plants; species profiles of some suitable aquaponic crops.

Workshop 2: Sunday 8 December at 4:00pm @ Bethlehem Study Centre

1. **Water chemistry 1:** The nitrogen cycle and nutrient flows.  
   **Practical:** Water quality monitoring – test kit use

2. **Water chemistry 2:** pH and alkalinity, other parameters and water quality troubleshooting.  
   **Practical:** Exploring pH

3. **Plant health and nutrition:** Nutritional requirements of plants; prevention recognition and treatment of plant parasites and pathogens, including an overview of principles of companion planting and of aquaponics-safe nutrients and pesticides

4. **Plant management:** Crop management strategy design; propagation, planting, and transplanting seedlings; pruning, harvesting and system balance.

Workshop 3: Sunday 15 December at 4:00pm @ Bethlehem Study Centre

1. **Introducing fish:** Anatomy, life cycles and reproductive strategies of fish; species profiles of some suitable aquaponic fish.

2. **Fish health:** Prevention, recognition and treatment of fish health parasites and pathogens.

3. **Fish management:** Calculating stocking densities and feed rates; managing fish harvests; transportation, quarantine and handling of fish.

4. **System design and considerations:** Climate, species selection and system design options; sizing systems; how to build.

5. **Caring for your aquaponic system:** Routine tasks and troubleshooting
1st Open day round

These activities need to be coordinated between IPCRI, Bethlehem Study Centre interns and its staff and Byspokes.

1st Open day round: Will take place between the 18th and 21st of December. It is proposed to divide the guest according to line of work and age, in order to give relevant information and presentations. For this section it is still needed to:

- Write a “press release”
- Prepare Arabic, English flyers
- Prepare a guest list
- Invite guests
- Arrange transportation
- Arrange refreshments

Proposed guests by Byspokes:

Schools - 19th of December, there will be several groups during the day
- Le petit prince school
- Campus on camps – Dehisha refugee camp (GIZ)

NGO’s and environmentalist – proposed date Friday 20th (early morning group)
- COMET - ME
- FOEME (Malek Abualfailat)
- PAIDIA
- Environmental Education Centre (Simon Awad)
- Shams Ard - Eco building Ramallah (Danna Masaad)
- PARC (Nadi Firaj)
- Nabi Saleh (Basem Tamimi)
- Lajee Centre – Aida camp (Salah Ajarma)
- Phoenix centre – Dehisha refugee camp
- UNRWA – Camp improvement programme (Sandy Hilal and Daniela Sanjines)

Individuals – Proposed date Friday 20th (Afternoon group)
- Rami – Shufat
- David (Gardener at Psychiatric hospital)
- Mazen – Hosh al Jasmin
- Mazen Qumsieh (Bethlehem University)
- George Rishmawi (Siraj)
- Rami - Jerusalem
- Gino Cassis (Beir Zeit)
- Andrew (Fair trade)
- General youth (like neighbours)
Calendar of Activities for Tel She’eva

Workshops
These workshops are delivered by Byspokes to interns of Desert Daughter

Workshop 1: Tuesday 3 of December

1. **Setting the scene:** Current global food production systems and the need for sustainable farming.

2. **Exploring 3 agricultural techniques:** An overview of aquaponic, hydroponic and wicking bed systems. Pros, cons, components, versatility and domestic economics.

3. **Introduction to plants:** Anatomy, life cycles and reproductive strategies of plants; species profiles of some suitable aquaponic crops.

Workshop 2: Tuesday 10 December at 10:00am

1. **Water chemistry 1:** The nitrogen cycle and nutrient flows.  
   **Practical:** Water quality monitoring – test kit use

2. **Water chemistry 2:** pH and alkalinity, other parameters and water quality troubleshooting.  
   **Practical:** Exploring pH

3. **Plant health and nutrition:** Nutritional requirements of plants; prevention recognition and treatment of plant parasites and pathogens, including an overview of principles of companion planting and of aquaponics-safe nutrients and pesticides

4. **Plant management:** Crop management strategy design; propagation, planting, and transplanting seedlings; pruning, harvesting and system balance.

Workshop 3: Sunday 22 December

1. **Introducing fish:** Anatomy, life cycles and reproductive strategies of fish; species profiles of some suitable aquaponic fish.

2. **Fish health:** Prevention, recognition and treatment of fish health parasites and pathogens.

3. **Fish management:** Calculating stocking densities and feed rates; managing fish harvests; transportation, quarantine and handling of fish.

4. **System design and considerations:** Climate, species selection and system design options; sizing systems; how to build.

5. **Caring for your aquaponic system:** Routine tasks and troubleshooting
**Systems maintenance tasks**

Do not forget to record all details such as water added to systems, water quality, harvest weights and any comments.

**Aquaponics:**

**Daily tasks**

- Visual inspection - Check all equipment (water and air pumps) is functioning, flow-rates of growbeds and biofilter are correct. Check that the sump tank water level is OK; check that the autosiphons are flowing properly (either siphoning or stopped – not trickling for more than a minute or two).
- Check fish tank – ensure fish are behaving normally, and that water levels are correct.
- Feed fish - make sure not to overfeed. If feeding pellets, then remember to remove uneaten food after three minutes. It is best to feed twice a day – morning and evening.
- Check the plants for pests and diseases – just a quick look but treat as necessary. If you find any large pests like crickets, catch them and feed them to the fish!

**Weekly tasks**

Once a week, try to devote a little more time to the systems. Perform all the daily tasks a little more thoroughly than normal, and in addition:

- Harvest, prune and support plants as necessary.
- Transplant seedlings if needed.
- Add chelated iron and other supplementary plant nutrients as necessary.
- Apply foliar feed or safe pesticides such as molasses spray to all plants if necessary.
- Full water analysis – test and record all parameters.
- Drain sludge from swirl filters.
- Net some fish for a visual health check.
- Harvest fish as necessary.
- Check water pH – adjust if necessary.

**Monthly tasks**

Once a month it is a good idea to clean the plumbing, as otherwise plant roots and biofilms can develop inside the pipework, increasing resistance to the flow of water, this compromising the pump’s efficiency.

- Clean entire system, including pipework, air filters in air pumps and airlifts.
- Check siphon shroud pipes for plant roots if necessary clean.
- Clean all the pipework (growbed supply pipes, pump to fish tank pipe). To clean the pipes, remove them and pull a large bottlebrush through them. Rinse them off and re-assemble. The gunk that you clean out makes great fertiliser for your garden!
- Harvest and re-stock fish as necessary.
Byspokes
Sustainable agriculture and resource management

Hydroponics:

Daily tasks
- Visual inspection - Check all equipment (water pump and water filter) is functioning, flow-rates of the trickling down rain are correct.
- Check water pump- top up with water if needed and record.
- Check and record water quality (EC, pH and temp)
- Check plants – ensure all plants are touching the water.
- Check the plants for pests and diseases – just a quick look but treat if necessary.

Weekly tasks
Once a week, try to devote a little more time to the systems. Perform all the daily tasks a little more thoroughly than normal, and in addition:
- Harvest, prune, plant and support plants as necessary.
- Add fertilizer and/or other supplementary plant nutrients as necessary.
- Apply foliar feed or safe pesticides such as molasses spray to all plants if necessary.

Monthly tasks
Once a month it is a good idea to clean the plumbing, as otherwise plant roots and biofilms can develop inside the pipework, increasing resistance to the flow of water, this compromising the pump’s efficiency.
- Clean entire system, including pipework, 20mm water delivery pipe and water pump.

pH meter calibration
Once a month it is a good idea to calibrate the pH meter as such:
- Rinse a small container with pH 7 buffer solution; discard the rinsing solution.
- Fill the container with fresh pH 7 buffer solution.
- Insert the pH sensor into the buffer solution and press and hold the “cal” button until the display starts flashing.
- Release the “cal” button, and wait for the display to read “end”.
- Remove the pH meter – it is now recalibrated and ready to use.
- Discard the used buffer solution.

Wicking bed:
This system is the least complicated. It just requires daily “normal” plant attention such as checking that they are looking good

Weekly tasks
Once a week, try to devote a little more time to the system. Perform all the daily tasks a little more thoroughly than normal, and in addition:
- Harvest, prune, plant and support plants as necessary.
- Add fertilizer and/or other supplementary plant nutrients as necessary.
- Apply foliar feed or safe pesticides such as molasses spray to all plants if necessary.
Plant Management

Food waste is a major issue in any household or business. In order to avoid this problem, it is very important to plan ahead. A good idea would be to create a planting schedule. Depending on the site’s need, careful consideration should be taken to the average food consumption of the site, which will dictate how many and which seeds should be planted and with how much time in between them. Therefore, the following should be taken into consideration:

<table>
<thead>
<tr>
<th>Crop type</th>
<th>Time to first harvest</th>
<th>Harvest method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greens (lettuce, chard, kale, pak choi, watercress)</td>
<td>30-45 days</td>
<td>Usually batch, though many can be harvested as “cut and come again”</td>
</tr>
<tr>
<td>Baby greens and herbs</td>
<td>15-45 days</td>
<td>Usually batch, though many can be harvested as “cut and come again”</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>75-90 days</td>
<td>Continual for several months.</td>
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<tr>
<td>Squash family (melon, squash, cucumbers)</td>
<td>60-100 days</td>
<td>Continual for a few months.</td>
</tr>
<tr>
<td>Sweet and chilli peppers</td>
<td>60-90 days</td>
<td>Continual for several months.</td>
</tr>
<tr>
<td>Strawberries</td>
<td>90-120 days</td>
<td>Continual for several months.</td>
</tr>
</tbody>
</table>

It is a good idea to keep a mix between continual crops such as cut and come back as well as one-batch crops; this will ensure that you always have something planted in your systems. Remember, particularly in the aquaponics system, that it is all about nitrates (NO₃), which is related with the amount of fish food given. Keeping an eye on the nitrates will help us assess if the balance between the fish and the plant is right. In winter time, when fish activity decreases it will probably not be possible to have the system as fully planted as in other seasons. Below a chart with suggested sowing times of different crops. It is also good to observe what other people is planting and what plugs are being sold at garden shops.

<table>
<thead>
<tr>
<th>Month</th>
<th>NFT pipes</th>
<th>DWC bed</th>
<th>Media beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>Lettuce varieties, Rocket, Spinach, Swiss chard, Parsley, Coriander, Watercress, Strawberries</td>
<td>Lettuce varieties, Rocket, Spinach, Swiss chard, Parsley, Coriander, Watercress, Pak Choi, Kale</td>
<td>Tomatoes, Cucumbers, Sweet peppers, Chilli peppers</td>
</tr>
<tr>
<td>February</td>
<td>Lettuce varieties, Rocket, Spinach, Swiss chard, Parsley, Coriander</td>
<td>Lettuce varieties, Rocket, Spinach, Swiss chard, Parsley, Coriander</td>
<td>Tomatoes, Cucumbers, Sweet peppers, Chilli peppers</td>
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<tr>
<td>Month</td>
<td>Lettuce varieties</td>
<td>Watercress</td>
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<td>March</td>
<td>Lettuce varieties</td>
<td>Rocket</td>
<td>Swiss chard</td>
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<td>April</td>
<td>Lettuce varieties</td>
<td>Rocket</td>
<td>Swiss chard</td>
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<td>July</td>
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<td>Swiss chard</td>
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<td>September</td>
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Troubleshooting

**Problem:** Pumps not running.
*Check:* That it is plugged in, and that the electricity cable is also connected to the mains. Check that there is not a power cut. If the pump is broken, buy a new one immediately.

**Problem:** Plants not growing well, looking unhealthy; parasite infestation.
*Check:* Apply foliar feed or aquaponics-safe pesticide if infestation is suspected. Test pH, ammonia, nitrite and nitrate levels. If nitrates are low, stock more fish or increase feeding. If pH is wrong, correct it.

**Problem:** Fish looking unhealthy or dying.
*Solution:* Test pH, ammonia, nitrite and nitrate – treat any water quality problems accordingly (see below). Visually inspect fish for parasites and treat accordingly.

**Problem:** pH too high or too low.
*Check:* Test KH, GH and pH. If pH is too high, add phosphoric acid each day until pH reaches 6.8-7.5, being careful not to change the pH by more than 0.2 points per day. If pH is too low, top up system with stored groundwater or add base such as CaO (lime).

**Problem:** Ammonia or nitrates too high.
*Check:* Check air pump and water pumps are working; check that the biofilter is not clogged or fouled, and that water is flowing normally. Stop feeding and remove uneaten food; test ammonia and nitrite every day till back to normal, resume feeding and continue testing the water for a couple of days more. Additionally you can exchange up to 50% of the water or harvest some fish.

**Problem:** Nitrates too high.
*Check:* Have plants been harvested/removed and not replaced? Transplant more seedlings to NFT pipes immediately; plant more seeds in seedling tray.

**Problem:** Algae bloom – water turns green.
*Check:* Ensure that the system is shaded from excess light. During an algae bloom it is common to get very low ammonia, nitrite and nitrate readings because the plankton takes up all available nutrients. By removing the light source, the plankton will die. Be vigilant for water quality problems, as a mass plankton die-off will liberate these nutrients and can cause very high ammonia levels. Plant more plants to take up available nutrients.

**Problem:** Plants suffering from fungus.
*Solution:* Increase flow rate in NFT pipes, consider adding natural fungicide or a biocontrol agent such as *Trichoderma* spp.. Harvest all plants and completely drain and sterilize the system (such as diluted bleach) before re-planting.
Supplier’s directory Bait Sahour

Support

- Byspokes
  Lorena Viladomat
  Founding director Byspokes
  lorena@byspokes.org
  0598128662
  0529578679

  Philip Jones
  Founding director Byspokes
  phil@byspokes.org
  0598021647

- IPCRI Office Jerusalem
  Robin Twite
  Director of the Environment and Water Department
  Robin@ipcri.org
  02-6769460

  Claudia Lora
  IPCRI “Growing Together” intern
  clora490@gmail.com
  0585101290

Materials

Occupied Palestinian Territories

- Fish food and fish fingerlings
  Arab Development Society: Fish food and fish fingerlings
  Jericho
  Contact: Sameer (Hatchery manager)
  Mobile: 0598108580
  Contact: Sinan
  Mobile: 0577788156

- Garden and building supplies
  Jammal Garden Centre: Water pumps, stones, IBC tanks, plugs, seeds, seedling trays and compost soil
  Beit Sahour, close to the Mercedes Benz garage
  Contact: Jammal
  Mobile: 0597298210

  Garden Centre Bethlehem: Phosphoric acid, plugs, seeds, and irrigation supplies
  Bethlehem
  Office: 022744322

  Tawwil: Building materials such as stones, breeze blocks, IBC tanks, glues
  Bait Sahour
  Office: 022773913
• Plumbing and plastics
Royal Plastics: Plastic materials such as PVC pipework
Royalplas, Hebron, Palestine
Contact: Monzer Zghier
Telephone: 0599365041
Email: monzer@royal.ps
Office: 022219800
info@roayl.ps
www.royal.ps

Issa Habeeb: High grade PVC plumbing as well as connecting pieces
Bait Sahour
Contact: Issa Habeeb
Telephone: 0598046144

Israel

• Aquaponics specialists
Living Green: Any aquaponic and hydroponic component such as: mesh cups, pumps, test kits, electronic meters, fish, fish food, organic hydroponic nutrient and more.
Contact: Moti Cohen
Mobile: 0502999209
Email: info@livinggreen.co.il
http://www.livinggreen.co.il

• Fish food and fish fingerlings
Raanan Feeds: Fish food
Raanan Feeds, Kfar Masaryk, Israel
Contact: Omri Lev
Telephone: 0508273018
Email: omri@raanan-fishfeed.com
Office: 049853453

Maga’an Michael: Fish fingerlings
Kibbutz Ma’agan Michael D.N. Menashe, Israel 37805
Contact: Yaron Siton
Mobile: 0522465773
E-mail: Madansales@mmm.org.il
www.madan.co.il/HTMLs/home.aspx
Aquaponics recording sheet

<table>
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<th>Date</th>
<th>Time</th>
<th>Temperature ºC</th>
<th>Ammonia</th>
<th>Nitrite</th>
<th>Nitrate</th>
<th>pH</th>
<th>Water added (L)</th>
<th>Comments</th>
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Hydroponics recording list

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<th>pH</th>
<th>EC</th>
<th>Water added (L)</th>
<th>Temperature (°C)</th>
<th>Fertilizer added (ml)</th>
<th>Comments</th>
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### Wicking bed recording list

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<th>Time</th>
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## Plant recording sheet

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<tr>
<th>Species planted</th>
<th>Quantity</th>
<th>System (A,H,W)</th>
<th>Date planted</th>
<th>Date harvested</th>
<th>Total Harvest weight</th>
<th>Heads harvested</th>
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Open day questionnaire - Bethlehem Study Centre

Personal information

Name:______________________________________________________________
Phone:____________________________________________________________________________________________________
Area you live in:________________________________________
Type of work:__________________________________________
Age:______________________________ e-mail ________________________________________________________________

1. Do you grow edible plants at home?    Yes    No

2. Do you see any potential benefits in these systems?    Yes    No

3. If so, in which one? (please select)
   Hydroponics
   Aquaponics
   Wicking bed

4. Why? (please select)
   It is space efficient
   It is water efficient
   Seems easy to build
   Seems cheap to build
   I could save money by growing my own food
   Other:____________________________________________________________________________________________________
   __________________________________________________________________________________________________________

5. Would you be interested in building any of the 3 systems in your house?
   Yes    No
6. If yes, which one? (please select)
Hydroponics
Aquaponics
Wicking bed

7. Why?

8. If not, why not? (please select)
I do not have the knowledge
I do not have the money
It looks too complicated
I do not have the time
I do not need to grow my own food
Other: __________________________

9. Would you be interested to attend to workshops that will teach you to build and manage any of the 3 systems? If yes, which one?

____________________________________________________________________________________________________________
____________________________________________________________________________________________________________

10. If you could grow edible plants at home which one would you grow?

____________________________________________________________________________________________________________
____________________________________________________________________________________________________________

11. Which presentation was the most interesting for you and why?

____________________________________________________________________________________________________________
____________________________________________________________________________________________________________

12. Would you be interested to come to similar open days in the future? Yes  No

13. Which other topics would you like to hear about?

____________________________________________________________________________________________________________
____________________________________________________________________________________________________________
____________________________________________________________________________________________________________
استطلاع للرأي عن اليوم المفتوح

تفاصيل شخصية

اسم: __________________________

رقم الهاتف: __________________________

مكان الإقامة: __________________________

الوظيفة: __________________________

البريد الإلكتروني: __________________________

العمر: __________________________

هل تقوم بزرع نباتات صالحة للأكل في البيت؟ نعم / لا

هل ترى آية منفعة من أنظمة الزراعة البديلة التي كننا عنها اليوم؟ نعم / لا

إن كان جوابك نعم، في آية نظام ترى هذه المنفعة؟

1. الزراعة المالية
2. الزراعة السمكية
3. الزراعة باستخدام الخاصية الشعرية

لماذا؟

1. لتوفير المساحة المطلوبة
2. لتوفير كمية المياه المستخدمة
3. لسهولة البناء
4. كلفة أقل
5. لتوفر النفايات من خلال زراعة طعامي
6. أسباب أخرى: __________________________

هل أنت مهتم ببناء واحدة من الأنظمة الثلاثة أعلاه؟ نعم / لا
أي واحدة من المنظمات كنت تستختار؟ ولماذا؟

---

إن كنت غير مهتم بذلك، ما هي الأسباب؟

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>ليس لديك المعرفة الكافية</td>
</tr>
<tr>
<td>2</td>
<td>لا تملك النقود الكافية</td>
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<tr>
<td>3</td>
<td>يبدو لك الأمر في غاية التعقيد</td>
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<tr>
<td>4</td>
<td>لا تملك الوقت الكافي</td>
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<tr>
<td>5</td>
<td>لا ترغب في تربية النباتات</td>
</tr>
<tr>
<td>6</td>
<td>أسابق أخرى: __________________</td>
</tr>
</tbody>
</table>

هل أنت مهتم بحضور ورشات عمل لتعلم بناء الاهتمام بأحد من هذه الأنظمة الثلاث؟ إن كان جوابك: أي نظام؟

---

إن كنت على استعداد لزراعة النباتات الصالحة للأكل في بيتك، فأي نوع كنت تستختار؟

---

أي موضوع من المواضيع المطروحة في هذا اليوم لا ترى لديك اهتمام أكثر من باقي المواضيع?

---

هل أنت مهتم بحضور يوم مفتوح آخر؟ نعم / لا

هل هناك مواضيع أخرى ترغب بالسماع عنها؟
Visitors’ questionnaire - Bethlehem Study Centre

Personal information

Name:____________________________________________________________________________________________________
Phone:____________________________________________________________________________________________________
Area you live in:________________________________________
Type of work:__________________________________________
Age:______________________________ e-mail _______________________________________________________________

1. Do you grow edible plants at home?                  Yes       No

2. Do you see any potential benefits in these systems? Yes       No

3. If so, in which one? (please select)
Hydroponics
Aquaponics
Wicking bed

4. Why? (please select)
It is space efficient
It is water efficient
Seems easy to build
Seems cheap to build
I could save money by growing my own food
Other:____________________________________________________________________________________________________
____________________________________________________________________________________________________________

5. Would you be interested in building any of the 3 systems in your house?
Yes       No
6. If yes, which one? (please select)
Hydroponics
Aquaponics
Wicking bed

7. Why?_________________________________________________________________________________________________

8. If not, why not? (please select)
I do not have the knowledge
I do not have the money
It looks too complicated
I do not have the time
I do not need to grow my own food
Other: ______________________________________________________________________________________________

9. Would you be interested to attend to workshops that will teach you to build and manage any of the 3 systems? If yes, which one?
____________________________________________________________________________________________________________
____________________________________________________________________________________________________________

10. If you could grow edible plants at home which one would you grow?
____________________________________________________________________________________________________________

11. Which topics related to environment and sustainability would you like to hear more about?
____________________________________________________________________________________________________________
____________________________________________________________________________________________________________
____________________________________________________________________________________________________________
استطلاع للرأي للزائر مركز بيت لحم للدراسات

تفاصيل شخصية

الاسم: ______________________________________________________________________

رقم الهاتف: __________________________________________________________________

مكان الإقامة: __________________________________________________________________

الوظيفة: _____________________________________________________________________

الإميل: _____________________________________________________________________

العمر: _____________________________________________________________________

هل تقوم بزرع نباتات صالحة للأكل في البيت؟ نعم / لا

هل ترى أن منشأة من أنظمة الزراعة البديلة؟ نعم / لا

إن كان جوابك نعم، في أي نظام ترى هذه المنافع؟

الزراعة المائية.

الزراعة السمكية.

الزراعة باستخدام الخاصية الشعرية.

لماذا؟

للتوافق بالمصالحة المطلوبة

للتوافق بكفاءة المستخدمة

لسهولة البناء

تكلفة أقل

لتوافق النقود من خلال زراعة طعامي

أسباب أخرى: _______________________________________________________________
هل أنت مهتم ببناء واحدة من الأنظمة الثلاثة أعلاه؟ نعم / لا

أي واحدة من المنظومات كنت ستحتملها، لماذا؟

إن كنت غير مهتم بذلك، ما هي الأسباب؟

1. ليس لديك المعرفة الكافية
2. لا تملك التمويل الكافي
3. يبدو لك الأمر في غاية التعقيد
4. لا تملك الوقت الكافي
5. لا ترغب في تربية النباتات
6. أسباب أخرى:

إن كنت على استعداد لزراعة النباتات الصالحة للأكل في بيتكم، فأي نوع كنت ستحتملها؟

هل أنت مهتم بحضور ورشات عمل لتعلم بناء الاهتمام بموضوع من هذه الأنظمة الثلاثة؟ إن كان نجاحك، أي نظام؟

عن أي قضية من قضايا البيئة أو الزراعة المستدامة تريد أن تعرف المزيد؟
Open day Activities programme

Topic “Importance of sustainable farming and local production”

Starting time - 9:30am till 3:30pm

9:30 – 09:50am: Arrivals

9:50 – 10:00: Talk in Arabic by Daniel Bannoura (Bethlehem study centre project manager) on: “Introduction to Bethlehem study centre, what is it all about.”

10:00 – 10:10: Talk in English by Robin Twite (IPCRI’s Director of the Environment and Water Department) on: “Introduction on IPCRI’s sustainable farming project.”

10:10 – 10:30: Talk in Arabic by Isra’a Hinde (BA in International law and human rights, project intern, WHO field researcher and ICHR intern) on: “Human right to access to food and importance of food security and sustainable agriculture.”

10:30 – 11:00: Talk in English by Philip Jones and Lorena Viladomat (Founding directors of Byspokes, and technical implementation team of the project here at the Bethlehem Study Centre) on: “Introduction to 3 sustainable farming techniques: aquaponics, hydroponics and wicking beds.”

11:00 – 11:15: Tour in Arabic/English of the 3 systems installed at the Bethlehem Study Centre, including daily maintenance (Emad Bannoura, project intern).

11:15 – 11:30: Coffee break

11:30 – 12:00: Talk in English by Alice Gray (Byspokes director and Permaculture consultant) on: “The importance on localising food production”

12:00 – 12:30: Talk in English by Paulina Viladomat (Nutritionist) on: “Health benefits on organic food and healthy eating.”

12:30 – 1:00: Talk in Arabic by Mohammed Mohameed (Farm manager of Ma’an Development Centre’s Bait Qad Permaculture farm) on: “Personal perspective on managing and working with sustainable farming systems.”

1:00 – 2:00: Lunch break

2:00 – 2:30: Talk in English by Christopher Somerville (Urban farming consultant for FAO in Gaza) on: “Urban farming as a coping strategy.”

2:30 – 3:00: Summary in English by Phil and Lorena.
Proposed Open Day for Tel She’eva

Topic “Importance of sustainable farming and local products”

Starting time - 9:30am till 3:30pm

Programme

9:30 – 10:00am: Arrivals

10:00 – 10:10: Introduction to “Desert Daughter project” by Mariam Abo Rekeek (Desert Daughter founder) (Arabic)

10:10 – 10:20: Introduction to “Growing together” project by Robin Twite (IPCRI’s Director of the Environment and Water Department) (English)

10:30 – 11:00: “Arid farming techniques, how to green the desert” by Alice Gray (Byspokes director and Permaculture consultant) (English)

11:00 – 12:00: “Use of local herbs” by Suhalia (Desert daughter participant) (Arabic)

12:00 – 12:30: “Introduction to 3 sustainable farming techniques: aquaponics, hydroponics and wicking beds.” by Philip Jones and Lorena Viladomat (Founding directors of Byspokes, and technical implementation team of the project) (English).

12:30 – 1:00: Tour of the 3 agricultural systems installed aquaponics, hydroponics and wicking beds including daily maintenance by Amal, desert daughter participant and project intern.

1:00 – 2:00 LUNCH BREAK

2:00 – 2:30: “Health benefits on organic food and healthy eating.” by Paulina Viladomat (Nutritionist) (English).

2:00 – 2:30: “Insights in urban gardening” by Moti Cohen (Owner of LivinGreen and aquaponic consultant for FAO in Ethiopia).

2:30 – 3:00: Summary in English by Phil and Lorena.