How permagardens and kitchen gardens contribute to household food security:

An Assessment of Gardens in Nepal

March 2020

About SCALE

SCALE (Strengthening Capacity in Agriculture, Livelihoods and Environment) is an initiative funded by USAID's Office of Food for Peace (FFP) and implemented by Mercy Corps in collaboration with Save the Children. SCALE aims to enhance the impact, sustainability and scalability of FFP-funded agriculture, natural resource management, and alternative livelihood activities in emergency and development contexts.

About PAHAL

PAHAL (Promoting Agriculture, Health and Alternative Livelihoods) is a five-year Development Food Security Activity (DFSA) funded by the USAID's Office of Food for Peace (FFP) within the USAID/Nepal's Community Resilience Program. PAHAL aims to achieve food security among vulnerable populations in 14 districts in the middle and high hills of Mid and Far-Western Nepal.

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Acronyms and abbreviations

AGCD	Agriculture collection of data survey 2019
CII	Complementary impact inquiry
DFSA	Development Food Security Activity
FFP	USAID Office of Food for Peace
MOH	Ministry of Health (Nepal)
NRM	Natural resource management
NRP	Nepalese rupees
PAHAL	Promoting Agriculture, Health and Alternative Livelihoods
SCALE	Strengthening Capacity in Agriculture, Livelihoods and Environment
TOPS	Technical and Operational Performance Support (Program)
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
WHO	United Nations World Health Organization

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Contents

Summary

Gardens have provided participating households with improved food security, income and savings, and the improved farming techniques introduced by the program have enabled them to cope better with production shocks and constraints

Promoting Agriculture, Health and Alternative Livelihoods (PAHAL) is a five-year development food-security activity funded by the United States Agency for International Development (USAID). PAHAL was implemented by Mercy Corps and partners from 2014 to 2019 in fourteen districts in the hill and mountain areas of Mid- and Far-Western Nepal.[1]

The program was designed to improve the food security of vulnerable communities and build their capacity to learn, cope and adapt in the face of shocks and stresses. More specifically, the program aimed to improve access, availability and use of food and income with associated health and nutrition benefits through improved agricultural production and marketing.

This report presents the findings from a study of the PAHAL permagarden and kitchen garden activities, one component of the program's broader food security and resilience-building strategy.

The main objective of the study was to assess the impact of these gardens on household food security and identify any associated income and nutrition benefits. The study also investigated the adoption rates of new farming technologies and practices, and assessed to what extent the PAHAL gardens helped people cope with two of the most prevalent shocks and stresses in the program area: crop pests and disease, and water shortages.

The study explored other benefits derived from the gardens as well, and comparisons between the two approaches of permagardens and kitchen gardens.

Analysis was based on secondary and primary data from PAHAL participants.

- **Secondary data was collected on production, consumption, sales and income from 2,554 farmers** using a standardized questionnaire, and included a subset of 134 farmers who had participated in permagarden activities.
- **Primary data was collected on perceptions of the impacts and benefits of the gardens from 61 permagarden farmers and 59 kitchen garden farmers** using a standardized participatory scoring exercise.

The results were positive.

- The most important impacts were **food security benefits**, along with perceived **health and nutrition benefits** associated with increased and regular consumption of fresh vegetables.

  The number of **food types** being consumed on a regular basis increased as a result of the gardens. Over 60% of all study participants regularly consumed six or more new types of food.

  Over 48% of all study participants specifically mentioned perceived improvements in **nutrition** and 25% reported **year-round availability of food** as a result of the gardens.

- The gardens played an important role in helping people to cope better with crop pests and disease, and water shortages (often linked with drought), the two most important production shocks or constraints in the program area and key proxy indicators for **resilience**.

  PAHAL **garden practices** appear to have been more effective in managing production constraints than more traditional practices. Over 83% of participants gave a score of 7 or more for the water shortage/drought

1 Mercy Corps (2019) Promoting Agriculture, Health and Alternative Livelihoods (PAHAL) Fiscal Year 5 Quarter 3 Report (April to June).

indicator. Similar scores for the crop disease indicator were given by 80% of permagarden participants and 59% of kitchen garden participants.

- The gardens provided participating households with improved **sales, income and savings**.

  For both types of gardens, participants reported improvement in **crop production**. Mostly the increase was used for consumption within the household, but 13 to 21% was sold and the rest shared.

  Income from sales, or **savings** from reduced food expenditure, was primarily used for household expenditure, followed by savings and then education.

- Both permagarden and kitchen garden study participants reported benefits such as improvements in **skills and knowledge,** and savings on **time and labor** as a result of the program gardens and associated farming practices.

  There was a high uptake of permagarden and kitchen garden **technologies and practices**.

  Permagarden and kitchen garden **training** was found useful by participants, with average scores of 7.7 and 7.8 respectively out of a maximum possible utility score of 10.

Despite the two types of gardens producing similar results, there were perceived differences captured in the primary data:

- Permagardens were perceived to be better for the environment.
- Kitchen gardens were perceived to be easier to manage and to teach to other farmers.
- Permagardens produced higher yields per square meter and farmers engaged in both practices expressed an overall preference for permagardens.
- Permagardens seemed more resilient to crop pests, but further investigation is needed to collate more comprehensive data.

Overall, the study findings suggest that both types of gardens can play an important role in contributing to people's resilience. They appear to be a beneficial intervention as part of a broader resilience-building strategy in the hill and mountain areas of Western Nepal.

Ezra Millstein / Mercy Corps

Tom van Cakenberghe / Mercy Corps

Introduction

Background

The PAHAL program was implemented in the Mid- and Far-Western regions of Nepal, an area characterized by low income and high levels of food insecurity.[2]

Despite 80% of households being dependent on agriculture, productivity is poor for many reasons. These include: water scarcity, crop pests, landslides, hail, small farm sizes, poor quality or expensive inputs, lack of extension services and labor constraints as household members migrate to India and beyond in search of employment.[3]

A quarter of households in the PAHAL intervention area of Nepal cannot afford a basic nutritious diet, and stunting rates reach 55%

The remoteness of the PAHAL intervention area means that food prices are high. Because of this, combined with pervasive poverty, a quarter of households cannot afford a basic nutritious diet.[4] Despite considerable improvements in nutritional status over the past decade, stunting rates in the PAHAL area can reach as high as 55%, the highest in the country.[5]

In response to this, PAHAL included a component to increase agricultural production and improve access to nutritious foods.[6] Under this, Mercy Corps and partners provided support to **permagardens** and **kitchen gardens**, including training, demonstrations and extension support to farmers. Both these approaches were well suited to the program context.

- **Permagardens** were new to the program area. The PAHAL team introduced principles of agroecology, conservation agriculture and permaculture. They also emphasized the use of locally available natural resources, the importance of local context and community knowledge, and the integration of techniques to improve soil health, water management and efficient land use. Building the capacity of farmers to design and maintain more resilient plots that can be adapted as needed over time, was central to this methodology.[7]
- **Kitchen gardens** were common in the program area as traditional Nepalese gardens before PAHAL started. They incorporated local vegetables and herbs, but seldom included techniques aimed at improving water management and soil conservation. PAHAL added to traditional approaches in a number of ways, including the introduction and promotion of new vegetable varieties, new technologies and improved farming practices focused on water and soil management.

These garden interventions were a sub-component of the broader PAHAL resilience-building strategy, as they were implemented alongside natural resource management (NRM) and market systems development components.

Permagarden activities started during the last quarter of 2017 and continued to the end of 2018. Kitchen garden activities started earlier, in June 2016, and continued to the end of the program. See *Table 1* for the timeline of garden activities.

2 Mercy Corps (2017) PAHAL Program Strategic Resilience Assessment (STRESS) report, Promoting Agriculture, Health and Alternative Livelihoods.
3 Ibid. See *Table 6* for more detail on shocks experienced in the PAHAL operational areas.
4 United Nations Population Fund (2011) Nepal, National Demographic and Health Survey, 2011.
5 Ministry of Health, Nepal; New ERA; and ICF. 2017. Nepal Demographic and Health Survey 2016.
6 United States Agency for International Development (ND) Nepal Fact Sheet; Promoting Agriculture, Health and Alternative Livelihoods.
7 Technical and Operational Performance Support (TOPS) Program (2017) Permagarden Technical Manual Second Edition. Technically the permagardens could be classified as kitchen gardens but there are important distinctions between these and traditional Nepalese or PAHAL kitchen gardens. For the purpose of this report we therefore refer to the traditional gardens as kitchen gardens.

Gardens have contributed to improved consumption of fresh vegetables and other foods, with associated improvements in health and nutrition

Table 1 Timeline of the PAHAL permagarden and kitchen garden activities

Permagardens	Date
Training of trainers on the permagardens	November 2017
Piloting of permagardens	November 2017 onwards
Capacity-building training on permagardens for field staff	May to August 2018
Training and orientation on permagardens for lead farmers **Replication of permagardens in farmers' fields** **Periodic follow-up by lead farmers and agriculture field staff**	September to October 2018
Training and demonstration of permagardens at group level, with ongoing technical backstopping on permagarden techniques for field staff **Replication of permagardens in farmers' fields** **Periodic follow-up by lead farmers and agriculture field staff**	August 2018 onwards

Kitchen gardens	Date
Orientation on kitchen gardens for agriculture field staff	June 2016
Kitchen garden intervention at field level **Periodic follow-up by agriculture field staff**	June 2016 onwards
Orientation on kitchen gardens for lead farmers **Periodic follow-up by agriculture field staff**	September 2017
Kitchen garden interventions through lead farmers **Periodic follow-up by agriculture field staff**	September 2017 onwards
Refresher training on kitchen gardens for field staff and lead farmers **Periodic follow-up by agriculture field staff**	2017 to 2019

Data source: PAHAL program staff

Elena Schweitzer / stock.adobe.com

Methodology

Research questions

The main objective of the study was to assess the impact of PAHAL permagardens and kitchen gardens on household food security and any associated income and nutrition benefits.

The study also investigated and assessed:

- the adoption of new farming technologies and practices
- the extent to which PAHAL gardens helped people cope with crop pests/ disease and water shortages, the two most prevalent shocks and stresses in the program area, considered to be useful proxies for resilience by PAHAL program staff
- other benefits derived from the gardens
- indicative comparisons between the two approaches.

The study was structured around the following research questions.

- To what extent have participants applied the permagarden and kitchen garden training techniques and how useful have these been?
- What impact have PAHAL permagardens and kitchen gardens had on household food security, nutrition and income?
- To what extent have the permagardens and kitchen gardens helped people cope with production shocks and stresses?

Samir J Thapa / Mercy Corps

Methods

The study included analysis of two forms of data collected during the program:

- **secondary data** from an agriculture collection of data (AGCD) survey carried out in 2018
- **primary data** from a complementary impact investigation (CII) carried out from August to September 2019.

Secondary data

The AGCD survey used a standardized questionnaire to collect both qualitative and quantitative data, which included modules on:

- program participation, including permagarden or kitchen garden training
- adoption of farming practices being promoted by the program
- crop production and use, including consumption and sales
- information on production shocks experienced during the 2017 to 2018 agriculture season
- comparison of the permagarden and kitchen garden approaches for permagarden participants.

Primary data

The CII used a set of standardized participatory scoring exercises to:

- capture and understand perceptions of the value of program training activities and changes in the household food situation attributed to PAHAL gardens as a proxy for food security
- assess the extent to which the gardens had helped people cope with water shortages and crop pests.

Participants were asked to give scores on a scale from 1 to 10, representing the relative value or importance of given variables, such as improvement in food security.

The CII also collected data on the number and type of new foods being consumed as a result of the gardens.

Sampling

The study sample was made up of 2,554 PAHAL farmers who had participated in the most recent AGCD survey, stratified into two categories.

- Farmers who had received permagarden training and established a permagarden (138).
- Farmers who had not received permagarden training and were exclusively engaged in kitchen gardening (2,320).

The permagarden sample included 22 male and 116 female farmers, from whom a second sample was selected for the CII of 61 permagarden farmers (nine male and 52 female) and 59 kitchen garden farmers (10 male and 49 female).

The kitchen garden sample included 501 male and 1,819 female farmers.

Any variations in sample size for specific exercises due to attrition or other factors are reflected in the results charts and tables.

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Data analysis

Secondary data on the application of new agricultural practices, and production sales and income were calculated for the mean and range. Results on adoption rates of new practices were presented as percentages in a frequency table.

Primary data scores on the value and usefulness of program training activities, changes in food security, resilience in terms of crop pests/disease and water shortages, and the number of new food types being consumed were also calculated for the mean and the range.

Data on other types of benefits derived from the gardens and comparisons between permagardens and kitchen gardens were presented either in terms of the total number or the percentage of responses.

Over half of the permagarden participants are now consuming leafy greens and radishes, and over 45% of farmers from both groups consume beans on a regular basis as a result of the program gardens

Study limitations

The results should be considered in light of a number of limitations.

- As with all field-based research in a development context, various **non-sampling errors** and **biases** can be expected.
- The study relied heavily on **secondary data** which was not specifically collected with the objective of addressing the proposed research questions.
- Although the **primary data** was collected in the CII to complement and triangulate the secondary data, it did not fully address all the gaps needed to capture and attribute program impact effectively. This was partly due to time constraints, which necessitated data collection by program staff lacking specific experience with more complex impact assessment tools and methods. The assessment was designed with this in mind.
- The results for the exercise regarding the consumption of new food types also revealed some **questionable results from one study location**. On further inquiry, it appeared that the question had been misinterpreted and as a result the data from that particular location was excluded from the analysis.
- The figures on **production, sales and income** from the AGCD survey relied on recall over a twelve-month period and should be considered as **estimates** rather than absolute figures. Given the objective of the impact study was to assess changes (either positive or negative) and not to quantify these in absolute terms, this does not necessarily diminish the findings, but these figures should still be interpreted as estimates.
- The program was not designed to compare the two garden approaches directly, so **comparative field controls were not available** as needed for detailed data analysis. The ACDG and CII provide some level of comparison between the approaches, but detailed analysis would require more rigorous scientific controls.

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Results

Skills transfer

New techniques and practices were valued highly, and adopted by participants

For both permagardens and kitchen gardens, PAHAL trained farmers in a number of new techniques and practices. *Table 2* shows the perceived value/usefulness of these trainings.

On the scale of skills transfer, the maximum 10 was 'very useful' and 1 was 'not at all useful'. The average score was approximately the same for each type of garden: 7.7 for permagardens and 7.8 for kitchen gardens.

Table 2 Effectiveness of permagarden and kitchen garden training

Scores	Value/usefulness of permagarden and kitchen garden trainings	
	Permagardens (61 participants)	**Kitchen gardens** (59 participants)
10	5%	5%
9	10%	17%
8	48%	51%
7	26%	19%
6	10%	3%
5 or less	2%	5%
Total	**100%**	**100%**
Average score (range)	**7.7** (5, 10)	**7.8** (4, 10)

Data source: CII

All **permagarden** participants applied at least 14 new technologies or practices as a result of training, with an average of 22 across the study sample, see *Figure 1*.

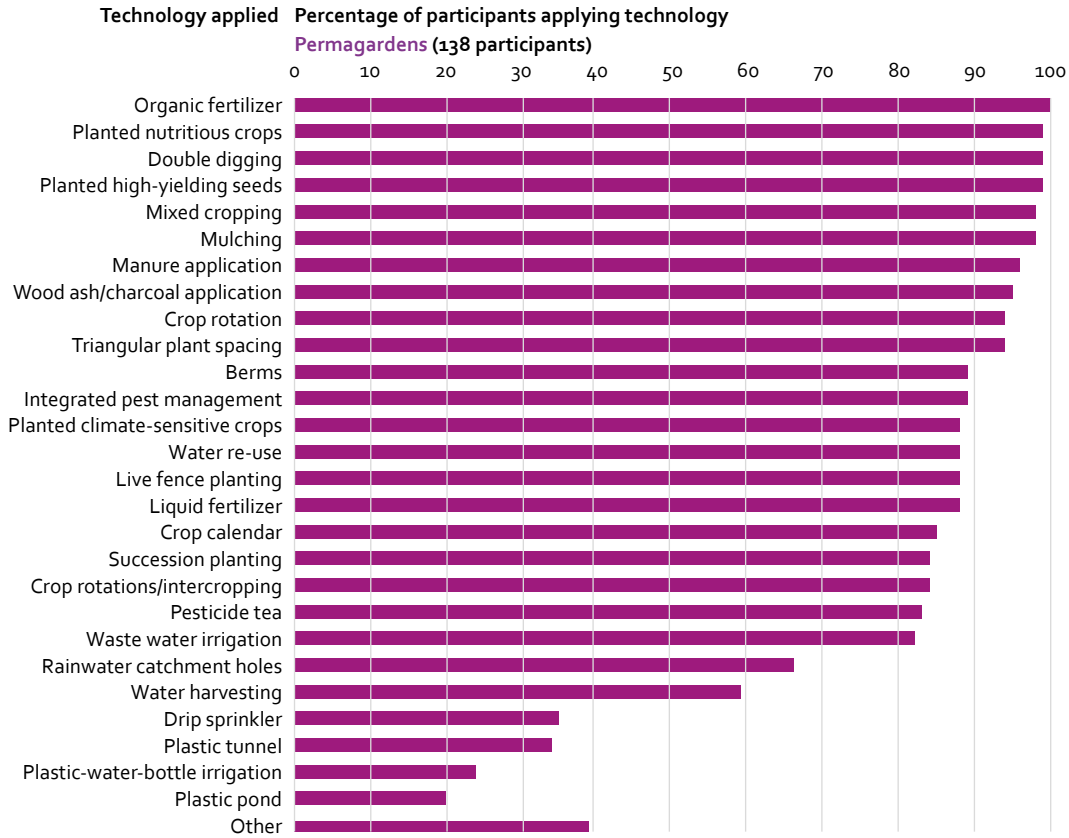
All **kitchen garden** participants applied at least one new technology or practice, with an average of nine across the study sample, see *Figure 2*.

Although not every technique was universally applied, the results generally show high uptake of the methods promoted by the program.

Permagarden farmers applied more new practices than kitchen garden farmers, but it is important to note that most of the permagarden practices were not taught to the kitchen garden farmers because of the differences between the approaches.

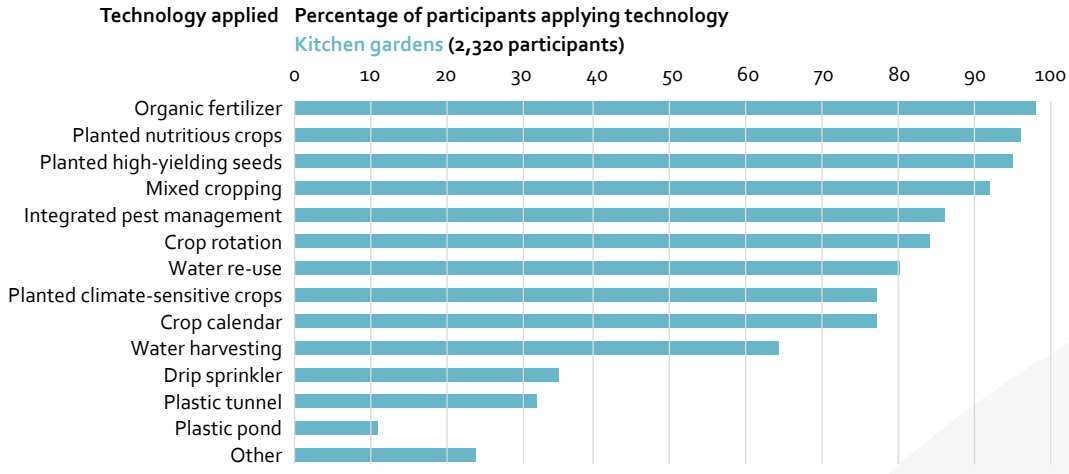
Miguel Samper / Mercy Corps

Figure 1 **Application of new permagarden technologies and practices**
(average 22, range 14, 28)



Data source: AGCD survey

Figure 2 **Application of new permagarden technologies and practices**
(average 22, range 14, 28)



Data source: AGCD survey

Production sales and income

The AGCD survey collected recall data on harvests, sales and income.[8]

Table 3 shows the average quantity of all crops harvested and sold from permagardens and kitchen gardens, as well as the average income derived from these sales over a 12-month period (2017 to 2018).

The results suggest kitchen gardens produced more food than permagardens, at least in terms of weight, but this may be because heavy crops like potatoes were commonly grown in the kitchen gardens, and/or the kitchen gardens were typically two and a half times the size of the permagardens. Given the difference in size, the results suggest permagardens produced greater yields per square meter.

Roughly the same quantities of harvested crops were sold from each type of garden, but this represented a greater proportion of the crops produced in permagardens than in kitchen gardens.

Table 3 Crop production and sales

	Average quantity/value (total)	
	Permagardens (138 participants)	**Kitchen gardens** (2,320 participants)
Garden (plot) **size**	42 m²	106 m²
Number of harvests (all crop types)	1	1
Amount harvested (all crops)	101 kg	158 kg
Percentage of harvested crops sold (all crops)	21%	13%
Quantity of harvested crops sold (all crops)	21 kg	20 kg
Income from crop sales (all crops)	670 NPR	772 NPR

Data source: AGCD survey

Figure 3 shows the average quantity of permagarden and kitchen garden crops harvested by crop type, over a 12-month period.

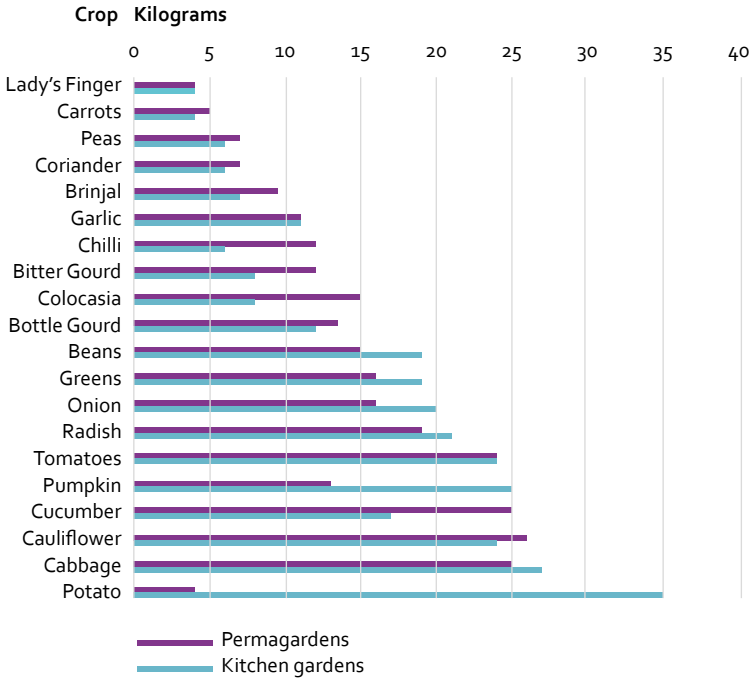
For **permagarden** participants the most important crops in terms of quantity produced were cauliflower, cucumber, cabbage and tomato, with potato being the least important.

For **kitchen garden** participants the most important crops were potato, cabbage, pumpkin, cauliflower and tomato, with potato being the most important, possibly due to kitchen gardens being larger than permagardens.

8 Note limitations to this type of data collection described in the methodology section.

Miguel Samper / Mercy Corps

Figure 3 **Average quantity of crops harvested by crop type**



Data source: AGCD survey

Figure 4 shows the average income from the sale of permagarden and kitchen garden crops by crop type.

For **permagarden** participants the most profitable crop was colocasia, followed by cucumber, tomato, chilli, bean, cauliflower and cabbage.

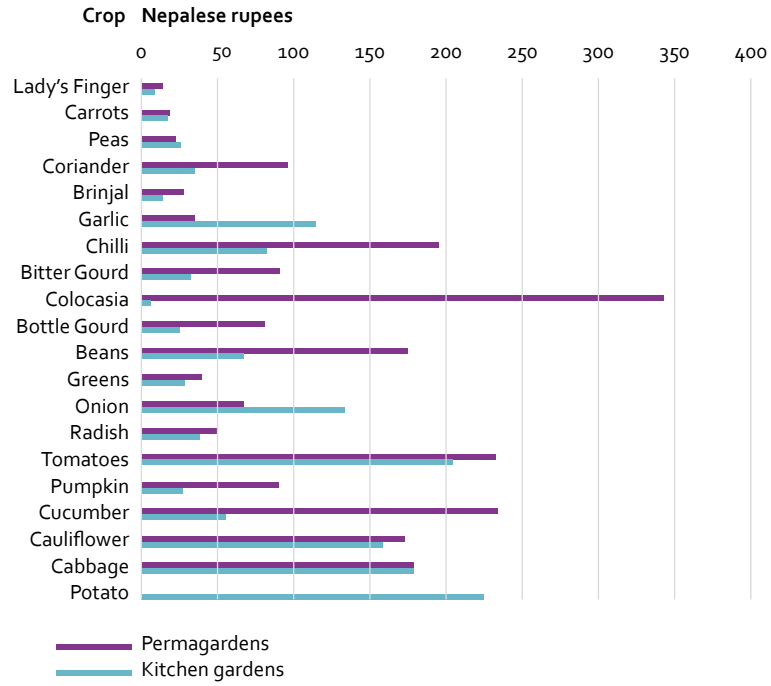
For **kitchen garden** participants, the most profitable crop was potato, followed by tomato, cabbage, cauliflower, onion, garlic and chilli.

Interestingly, the most important crop in terms of sales for one type of garden was also the least important for the other type, in both cases (potato and colocasia).

Jenny Bussey Vaughan / Mercy Corps

Joni Kabana / Mercy Corps

Figure 4 Average income from crop sales by crop type



Data source: AGCD survey

Figure 5 shows how farmers used the crops harvested from their permagardens or kitchen gardens over a 12-month period.

For both types of gardens, the crops were mostly used for consumption within the household, with 13 to 21% sold and the rest shared. The results suggest a slightly higher proportion of crops harvested from permagardens were sold than from kitchen gardens.

Figure 5 Use of crops from PAHAL program gardens

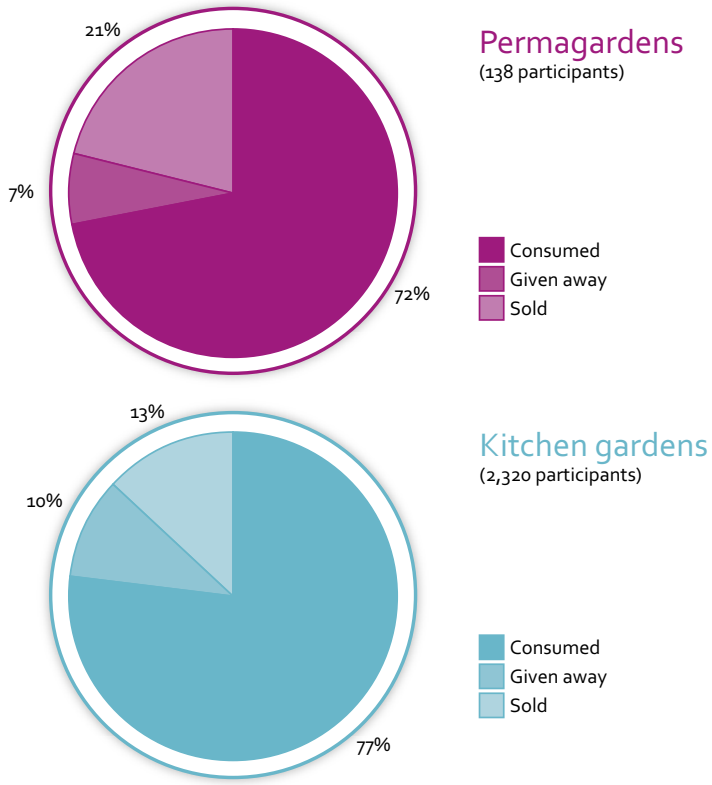
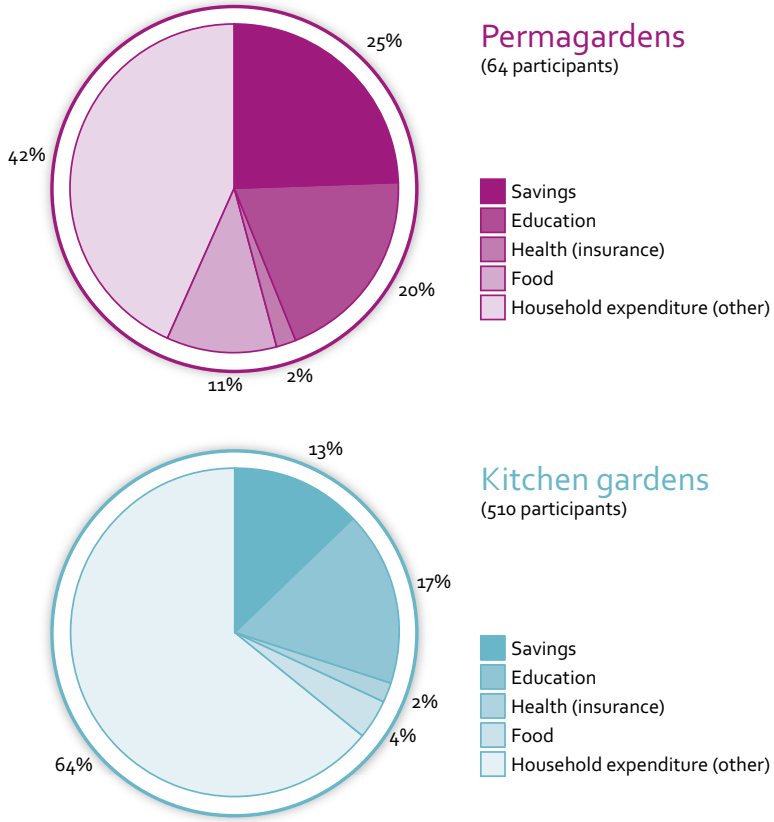


Figure 6 shows how farmers used the income from crop sales.

The results show this income was invested in health and education, as well as savings and other household expenses. Permagarden participants spent just over 10% of their income on food, enhancing the direct food security benefits derived from this type of garden.

Emilie Rex / Mercy Corps

Figure 6 **Use of income from crop sales**



Food security

Permagarden and kitchen garden participants were asked to what extent the gardens had helped improve their household food situation. Over 96% of both confirmed they had experienced improvement as a result of their gardens.

On the scale of food security, the maximum 10 was 'improved a lot' and 1 was 'did not improve at all'. Permagardens scored an average of 7.5 and kitchen gardens an average of 7.6, suggesting both types of garden made an important contribution to improved food security.

Table 4 **Contribution of gardens to food security**

Scores	Percentage of participants	
	Permagardens (59 participants)	**Kitchen gardens** (58 participants)
10	0%	7%
9	12%	12%
8	41%	43%
7	36%	19%
6	9%	10%
5	2%	5%
4	2%	3%
Total	**100%**	**100%**
Average score (range)	**7.5** (4, 9)	**7.6** (4, 10)

Data source: CII

Table 5 shows the number of foods regularly consumed by participants as a result of permagardens and kitchen gardens.

On average, participants consumed seven food types more frequently than in the past. It can be assumed some of these foods were purchased, see *Figure 4*, and others were produced directly in the gardens.

Of **permagarden** participants, 76% were now consuming six or more 'new foods', with over 50% consuming leafy greens and radishes.

Of **kitchen garden** participants, 60% were now consuming six or more 'new foods'.

All participants were consuming a minimum of four 'new foods'. The most common types of foods participants mentioned included cauliflower, cabbage, tomato, pumpkin and brinjal, with over 50% of participants now consuming these foods.

Over 45% of farmers from both groups were consuming beans on a regular basis as a result of the program gardens.

Table 5 **Number of 'new foods' now being regularly consumed**

Number of new foods	Percentage of participants	
	Permagardens (44 participants)	**Kitchen gardens** (43 participants)
10	14%	21%
9	9%	9%
8	25%	16%
7	21%	2%
6	7%	12%
5	11%	12%
4	14%	28%
Total	**100%**	**100%**
Average (range)	**7.2** (3, 13)	**6.9** (0, 14)

Data source: CII

Miguel Samper / Mercy Corps

Resilience: coping with shocks and constraints

Participants in the PAHAL program area experience a number of shocks and stresses. *Table 6* shows some of the common production shocks experienced by study participants from 2017 to 2018.

Production shocks were experienced by 36% of **permagarden** participants and 52% of **kitchen garden** participants in 2017/2018, with many of those households experiencing multiple shocks.

Crop pests/disease and water shortage were common to both, with permagarden farmers experiencing significant impacts from hail as well.

Table 6 Production shocks in the PAHAL program area

Type of shock	Percentage of participants affected	
	Permagardens (49 participants)	**Kitchen gardens** (1,216 participants)
Crop pests/disease	49%	84%
Drought (water shortages)	22%	26%
Hail	55%	16%
Landslides	2%	1%
Other	8%	13%

Note: Production shocks were experienced by 36% of permagarden participants (49 of 138), and 52% of kitchen garden participants (1,216 of 2,330), leaving 64% and 48% of permagarden and kitchen garden participants respectively who did not experience shocks.

Data source: AGCD survey

Results suggest that technologies and practices promoted by PAHAL were more effective in managing resilience to crop pests/ diseases and water shortage

Crop pests/disease and water shortage, the most common shocks to both garden types, were taken as proxy indicators for resilience. Participants' perceived ability to cope with those production shocks/stresses was assessed.

Participants were asked to what extent the gardens and associated agricultural practices had helped them to cope better with crop pests/disease and limited water availability. On this scale the maximum 10 was 'improved ability to cope by a lot' and 1 was 'did not improve ability to cope at all'.

For the crop pests/disease indicator, 80% of **permagarden** participants and 59% of **kitchen garden** participants gave a score of 7 or more. This suggests the technologies and practices promoted by the program had been more effective in managing crop pests/disease than farmers' previous practices.

For the water shortage indicator, over 84% of participants from both groups gave a score of 7 or more, suggesting the farming technologies and practices promoted by PAHAL were effective in helping participants manage limited water availability, also arguably enhancing their resilience.

Table 7 Resilience scores for ability to cope with crop pests/disease and water shortages

	Percentage of participants scoring for resilience to crop pests/disease		Percentage of participants scoring for resilience to water shortage	
Score	**Permagardens** (61 participants)	**Kitchen gardens** (59 participants)	**Permagardens** (61 participants)	**Kitchen gardens** (59 participants)
10	0%	3%	0%	0%
9	8%	3%	3%	9%
8	39%	24%	39%	42%
7	33%	29%	46%	34%
6	7%	24%	5%	7%
5	8%	12%	3%	92%
Less than 5	5%	5%	3%	2%
Total	**100%**	**100%**	**100%**	**100%**
Average (range)	**6.9** (1, 9)	**6.7** (1, 9)	**7.1** (1, 9)	**7.2** (1, 10)

Data source: CII

Other impacts and benefits

Figure 7 shows the most important benefits of the permagardens and kitchen gardens perceived by the participants, in addition to the resilience proxies.

The most important benefits for both groups were improvements in **food security** in terms of access, availability and consumption. 'Year-round availability of food' as a result of the gardens was also mentioned by 25% of all participants.

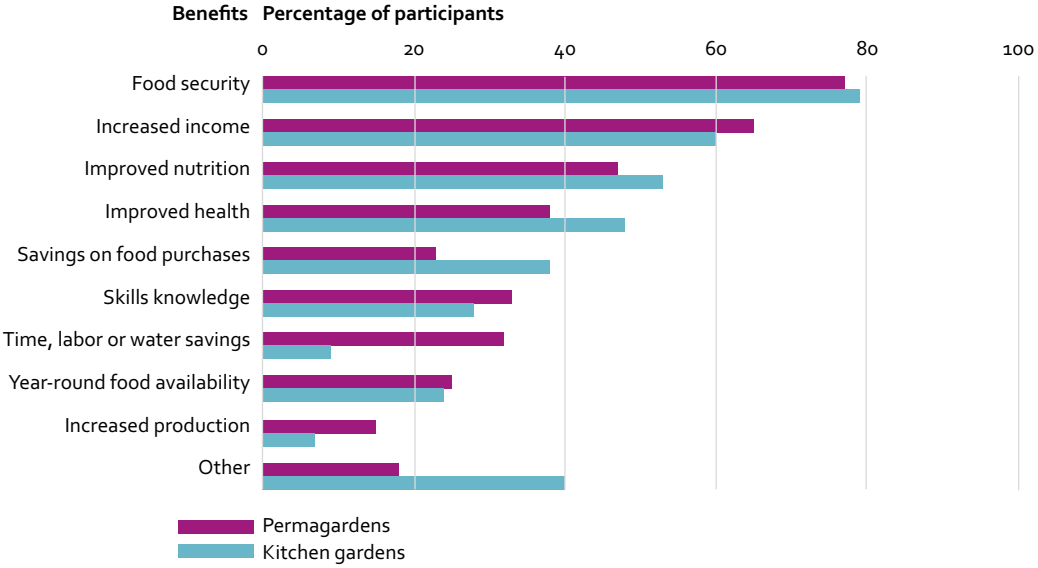
Increased income received the second highest number of responses and, when combined with **savings on food purchases**, likely represents an important program benefit.

Respondents also mentioned the **health** and **nutrition** benefits, attributing these to an increase in the consumption of fresh vegetables.

Skills and **knowledge** transfer were also reported with reference to improved soil and water management.

Savings on **time, labor inputs and water use** also featured. Other less frequently mentioned benefits included an improvement in women's leadership, a reduced dependence on fertilizers (for the kitchen garden group) and increased production for both groups.

Figure 7 **Permagarden and kitchen garden benefits noted by respondents**



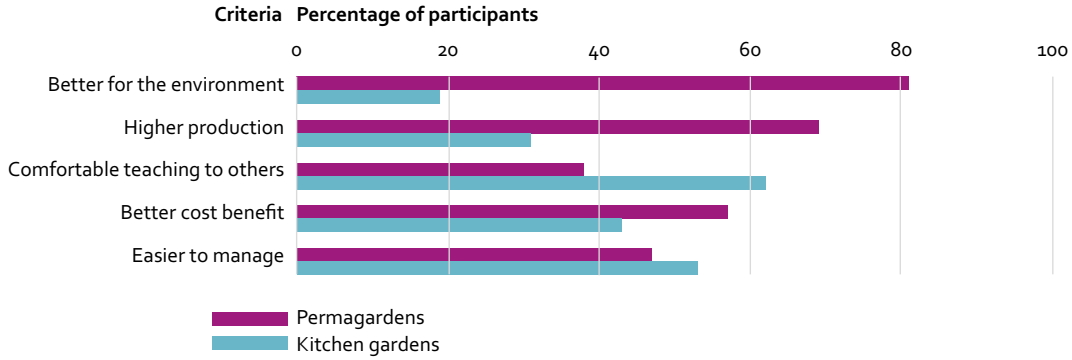
Data source: CII

Comparing permagardens and kitchen gardens

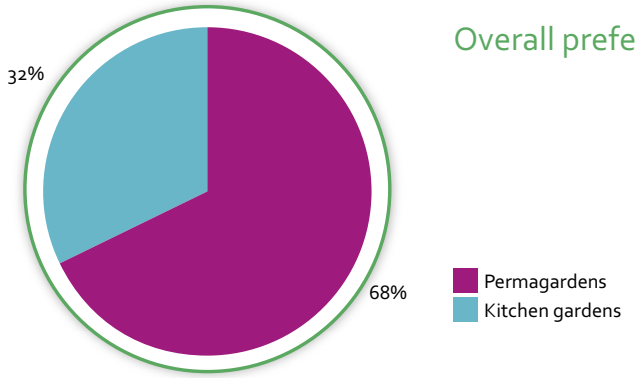
Figure 8 shows the results from an exercise carried out with permagarden participants who had also participated in the kitchen garden activities and had applied both approaches.

These participants were asked to give their overall preference and compare the two approaches against a set of five criteria. The majority (68%) reported an overall preference for permagardens. Similarly, 69% also felt permagardens provided higher production than kitchen gardens and 81% felt that they were better for the environment. However, 53% felt kitchen gardens were slightly easier to manage and 62% felt kitchen gardens much easier to teach to other farmers.

Figure 8 Preferences between permagardens and kitchen gardens



Data source: AGCD survey



Ezra Millstein / Mercy Corps

Kristin Lambert / Mercy Corps

Discussion on impact and benefits

The study confirms positive outcomes and livelihood impacts from both permagardens and kitchen gardens. These include improvements in food security, consumption of nutritious foods and income and savings benefits.

Jenny Bussey Vaughan / Mercy Corps

Skills transfer

The findings suggest that both permagarden and kitchen garden training activities were successful in terms of value and use by program participants, scoring an average of 7.7 and 7.8 respectively.

Consistent with this, every single study participant applied at least one new technology or practice, with an average of 22 new techniques or practices applied by permagarden participants and nine by kitchen garden participants.

Production sales and income

The study shows benefits from the program gardens to both income and savings. On average, participants sold about 20 kg of various crops produced from the gardens during the 2017 to 2018 season.

The most important cash crops from both the permagardens and kitchen gardens were tomato, cauliflower, cabbage and chilli. However, there were some discrepancies between the two types of gardens. For example, potato was the most profitable crop for kitchen gardeners, whereas colocasia and cucumber were the most profitable for permagarden participants.

On average, sales from crops over a 12-month period, translated into 670 NPR ($US 5.91) for permagarden participants and 772 NPR ($US 6.81) for kitchen garden participants. Although this is a relatively small amount of money, increased income was reported to be the second most important benefit by study participants. This may suggest under-reporting on income from crop sales or a recall bias for survey participants, or it may suggest that the greater financial benefit for households is the savings on food purchases that the gardens enabled.

Some study participants explicitly reported savings on food purchases as one of the most important benefits of the gardens, but it is possible that those who reported the income benefits also considered savings as indirect income.

Other benefits included savings on time and labor, although permagarden farmers reported these more frequently than kitchen garden farmers.

Food security

In line with PAHAL's food security objectives, positive changes in crop production had positive impact on household food consumption.

On average, permagarden participants produced over 100 kg of food and kitchen garden participants produced over 150 kg of food during the 2017 to 2018 cropping season. Over 70% of this food was consumed within the household. This finding is supported by the fact that over 95% of study participants reported that their food situation had improved due to the program gardens.

Food security, in terms of availability and access, was the most commonly reported benefit. The results from the food security scoring exercise support this finding, showing average scores of 7.5 and 7.6 for permagardens and kitchen gardens respectively.

The results show an increase in the number of food types regularly consumed as a result of the gardens, with 75% of permagarden participants and 60% of kitchen garden participants now consuming six or more food types on a regular basis.

Some of these foods would include the 20 crop varieties produced in the gardens, while others would have been purchased through the sale of these crops. Some of these foods would have been produced (and consumed) before the program started, so technically they were not all "new foods" but they were now being consumed on a more regular basis.

For example, the gardens had allowed people to produce food throughout the year, with 25% of participants mentioning year-round food availability as a key benefit. Participants also reported improved production as a benefit, although this was more commonly reported by permagarden farmers (15% compared to 7%).

Although the study did not measure changes in nutritional status, the results showing improvements in consumption and dietary diversity provide a useful proxy for improvements in this. Nutrition-related benefits were mentioned by 48% of participants without prompting and health benefits as a result of consuming more fresh vegetables were mentioned by 39% to 46%. When combined, these results provide a reasonable level of confidence that permagardens and kitchen gardens contributed to improved nutrition outcomes for participants.

Resilience: coping with shocks and constraints

Results suggest the program gardens helped people to cope better with production shocks and stresses.

The study looked specifically at crop pests/disease and water shortages, the two most commonly reported production shocks or constraints in the program area.

Miguel Samper / Mercy Corps

For the crop pests/disease indicator, 80% of permagarden participants and 59% of kitchen garden participants gave a score of 7 or more, indicating that the gardens had been important in helping them to cope with this shock. This suggests that the pest management techniques and other farming practices supported by the program were successful.

Similarly, for the water shortage indicator, over 83% of study participants gave a score of 7 or more, again suggesting the water management practices promoted as part of the garden interventions had been effective. This is furthermore supported by the fact that participants mentioned savings on water usage as an important benefit.

Permagardens appear to produce higher yields from smaller plots of land

Comparing permagardens and kitchen gardens

In general, the results are similar for both types of farming practice; both appear to have been successful in achieving the program's food security and capacity building objectives.

Permagardens appear to produce higher yields from smaller plots of land and possibly involve less time than kitchen gardens, but participants engaged in both approaches maintained the permagardens were more difficult to manage. It is possible this perception might change over time as permagardens can be difficult to establish (techniques such as double digging are labor intensive)[9] but once established they require less maintenance and upkeep.

The results also suggest the permagarden approach may be more effective in managing crop disease, as almost twice as many kitchen garden participants experienced production shocks due to crop pests from 2017 to 2018. These garden practices were felt to be important in helping to cope with crop pests (a score of 7 or more) by 80% of permagarden participants. In contrast, less than 60% of kitchen garden participants felt the same. Consideration should also be given to the fact that the permagardens are typically less than a quarter of the size of kitchen gardens, making pest management easier.

Participants engaged in both approaches gave an overall preference for permagardens (68% versus 32%) and, in addition to higher production, they felt permagardens were considerably better for the environment. This would suggest the permagarden approach may be better suited to programs like PAHAL seeking to achieve improved NRM outcomes.

A small majority of these farmers also felt the permagardens were better from a cost-benefit point of view. On the other hand, program staff suggested that kitchen gardens were more successful in lowland areas than hilly areas. It may be useful for future programs to examine the cost benefits of the different approaches in terms of time and labor inputs relative to production and to examine contextual factors that may favor one type of approach over the other.

9 Based on interviews with program staff.

Conclusions

Andrea Mottram / Mercy Corps

The study findings provide a considerable amount of evidence that PAHAL program permagardens and kitchen gardens contributed to improved food security for participating households in terms of availability and access to food.

They also show that the gardens contributed to improved consumption of fresh vegetables and other foods, with associated improvements in health and nutrition. It is reasonable to suggest the gardens achieved the program objective of improving food security for vulnerable populations.

The impressive uptake and application of new farming technologies and practices also supports the program objective of improving 'knowledge and skills to manage and respond to social and ecological hazards to household food security'.[10] According to program staff, there is anecdotal evidence that non-program farmers have also been adopting and duplicating some of the permagarden techniques. If accurate, this would imply these practices are both sustainable and effective in improving production and food security.

The permagarden and kitchen gardens form only one component of the PAHAL program's broader resilience-building strategies, so they are not expected to build resilience in isolation from other program activities or the actions of other actors. However, the study findings do show that the gardens contributed towards building people's resilience capacities.

The food security, income and consumption benefits provide evidence of this, as they are all useful indicators of improved resilience. The transfer and adoption of new farming skills and technologies also represent an improvement in people's capacity to learn, adapt and cope in the face of shocks and stresses. This is supported by the results regarding crop pests/disease and water shortages, which showed that the gardens had been important in helping farmers cope with these two production shocks.

The study could not definitively determine which of the two approaches is better, as they both have strengths and limitations. This comparison was also not the main purpose of the study.

Permagardens appear to produce greater yields per acre and possibly accomplish this with less time investment. There is also some evidence to suggest that permagarden practices are more effective in managing crop pests, but this needs to be further investigated.

Farmers practising both approaches overwhelmingly felt permagardens are better for the environment. This makes sense as the approach promotes biodiversity and is geared toward the use of sustainable, locally available materials such as organic pesticides.[11] However, farmers also felt the permagardens were more difficult to manage, and overall the results for both approaches were fairly similar.

Overall, the study findings are encouraging and demonstrate the value of both permagardens and kitchen gardens in improving household food security, as well as health and nutrition through the increased consumption of fresh vegetables. These impacts, combined with skills transfer, improved ability to cope with production shocks and constraints, and enhancements in income and savings, show that these gardens can contribute in a meaningful way toward building people's resilience capacities.

10 Mercy Corps. (2016). Promoting Agriculture, Health and Alternative Livelihoods (PAHAL) factsheet.

11 Technical and Operational Performance Support (TOPS) Program. (2017). Permagarden Technical Manual Second Edition.

Kristin Lambert / Mercy Corps

Miguel Samper / Mercy Corps

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