



The Key to Soil

Unlock agroecological soil health management together

Rulebook

Welcome to Provence!

Get ready to take part in this sunny region's vegetable-farming activities. But be warned: growing vegetables agroecologically is no easy task. Nematode soil infestation, difficulties accessing inputs, a hectic pace of work... There will be many obstacles in your way. Can you find the levers to overcome them?

The game *Key to soil: Unlock agroecological soil health management together* was created at INRAE's Ecodevelopment unit by Yann Boulestreau, with scientific support from Marion Casagrande and Mireille Navarrete, and scientific mediation support from Emily Henry. The development of this game was supported by ADEME, the ACT department and premature funding from INRAE, as well as UMT SIBIO and ITAB.

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Context

Agriculture bears a major responsibility for the key environmental challenges we face. However, to place this responsibility solely on farmers is to ignore the interdependence between the various players in the food system. Similarly, asking farmers to change their practices is only viable if we change the system in which they operate.

The Key to Soil is a role-playing game that allows you to put yourself in the shoes of the players in the food system who influence or decide on agricultural practices, in order to gain an in-depth understanding of the processes that hinder or facilitate change towards more environmentally friendly practices, and therefore the agroecological transition.

This game simulates a specific example: soil health management in sheltered vegetable farming in Provence. Why this example? Initially, *The Key to Soil* was designed as part of Yann Boulestreau's PhD thesis, to provide those involved in vegetable farming in Provence with an overall understanding of the obstacles to and levers of the agroecological transition.

Here's a bit of background to help you understand and play the game. Vegetable farming in Provence is mainly managed under shelters (plastic tunnels, plastic and glass greenhouses), with a focus on exports to other regions of France and abroad. Most farms specialize in a small number of species (melon, lettuce, tomato, eggplant, cucumber, zucchini), all of which are susceptible to common soil-borne pests. These are organisms living in the soil that damage the plants grown and/or reduce their yield. In Provence, root-knot nematodes (*Meloydogyne* spp.) are a particularly worrying example. These tiny worms (0.4 to 1mm long) initially roam freely in the soil, and will infect the roots of susceptible plants to reproduce. To multiply, the females cause galls to form, which disrupt root function.

Historically, soil health problems in sheltered vegetable farming have been managed with chemical or steam soil disinfection methods. However, these methods pose a number of problems, with the development of pest resistance, human health issues, high fossil fuel consumption, and extremely high costs. Over the last 20 years or so, alternative techniques have been developed and an agroecological approach has taken shape. This approach seeks no longer to drastically eliminate soil-borne pests and diseases, but to sustainably maintain their levels below a threshold where their economic impact is negligible. Instead of employing a single disinfection practice, it combines techniques such as:

- The use of trap cover crops – unharvested crops that trap pests;
- Organic enrichment to stimulate predators or competitors of soil-borne pests and diseases;
- Solarization – the soft pasteurization of the soil using a transparent plastic sheet to cover a plot in summer.

The key is to combine these techniques as effectively as possible while minimizing costs, investments, and your workload: this is the “key to soil”. In the rest of this guide, we'll explain the rules for playing *The Key to Soil*. Before you start, we recommend that you read the sections on the aim of the game, its key features, the components, how to play the game, and the role you'll be playing. This guide is completed by a video tutorial.

We wish you a lot of fun learning how to manage agroecological transition!

Aim of the game

Each player has to make as much profit as possible, i.e., earn as many buns as possible, while tackling the problems specific to their role. Buns are the game's currency, in the form of dried beans.

Key features

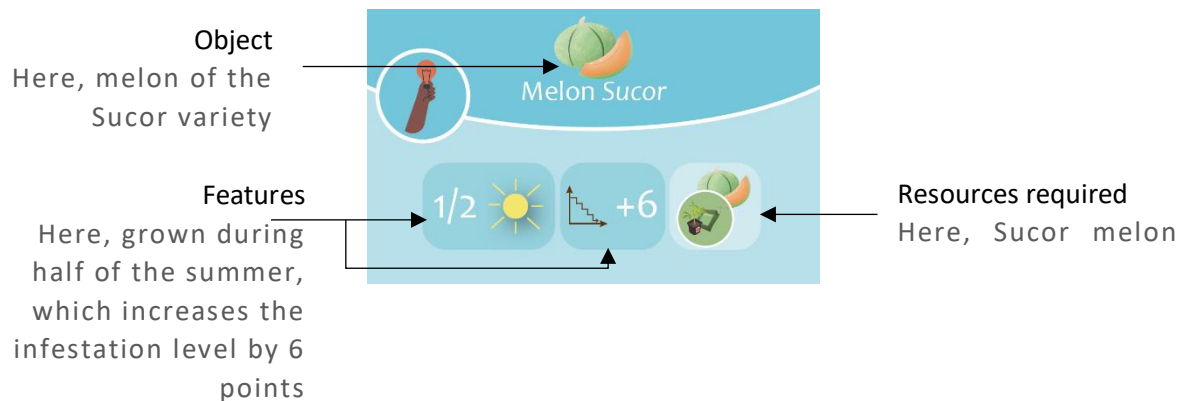
Number of players	6 to 27
Number of facilitators	1 to 2
Duration	45 to 60 minutes

It is advisable, if possible, to run the game with two facilitators when the facilitators are inexperienced, or when the group is large (over 20 students).

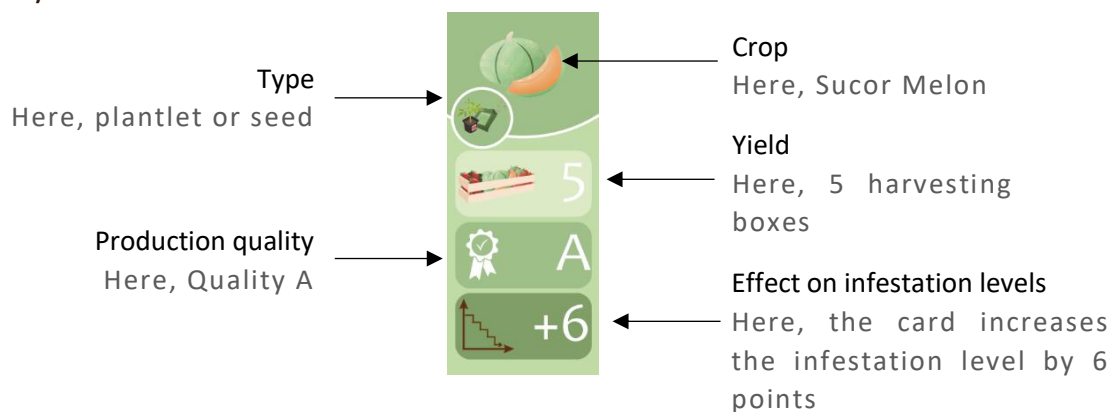
Components

4 types of cards

Know-how cards

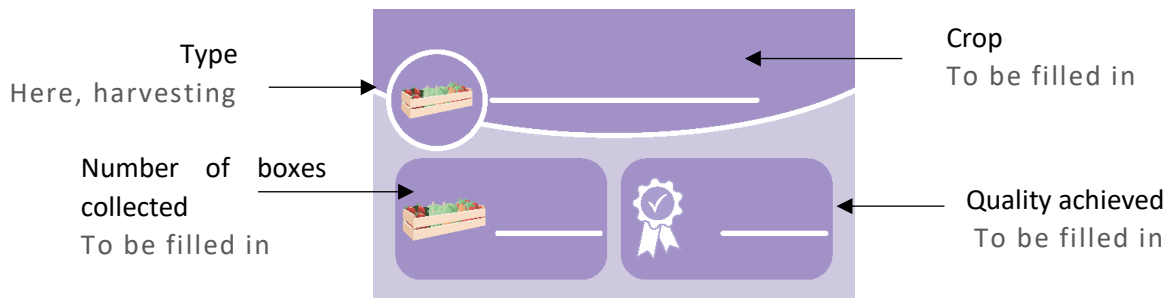


Plantlet/seed cards

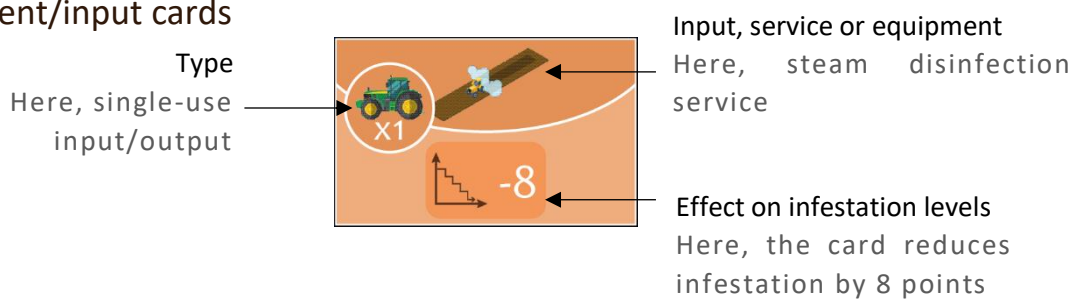


Harvest cards

The harvest cards are all blank and must be filled in by the players at the harvesting stage (see below).

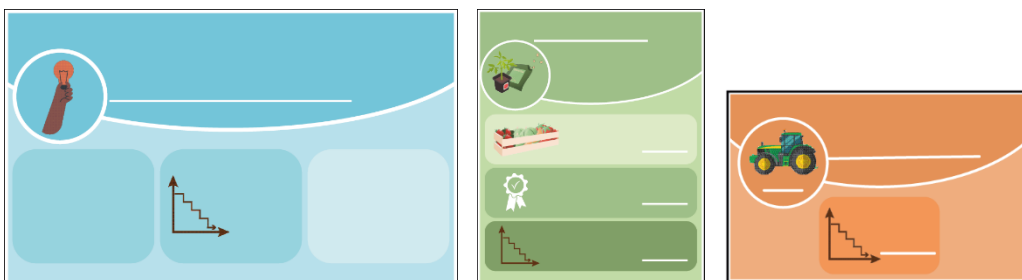


Equipment/input cards



Blank cards

Some know-how, plantlet/seed, and equipment/input cards are blank. They can be annotated by the players or facilitators to create new cards.



Game boards

There is one board for each role. The boards are described in the "Roles" section below.

Catalogs

There is one catalog for the technical advisor and another one for the supplier of inputs and equipment. The catalogs list the products and services sold by the advisor and the supplier.

To be brought along for all roles (not supplied in the game box)

- 1 calculator for each role played
- 1 pencil and eraser + 3 sheets of paper for each role played
- 1 whiteboard marker and cloth for each role played

Playing the game

The game is played in 6 rounds, corresponding to 6 consecutive seasons (summer/winter). Each round is split into 2 stages, as shown in the figure below. When there are more than 20 players, the game time increases to 5 minutes for Stage 1 (instead of 4 minutes) and 4 minutes for Stage 2 (instead of 3 minutes).

Don't get stuck! Any player needing more buns for purchases can take out a loan from the bank (game facilitator).

The Key to Soil is an open game, so don't hesitate to change the initial rules of the game to create, innovate, and collaborate to navigate the problems that come your way!

Stage 1: Land use and soil cover

1. Each **vegetable farmer** chooses which practices and which crop to use on each of their plots. But be careful! These choices will influence the development of soil-borne pests and diseases. This pressure will have an impact on the harvest.
2. To gain access to new practices, each farmer will have to acquire new know-how from the **technical advisor** in return for payment in buns.
3. Depending on the choices made, the **vegetable farmers** purchase plants, seeds, inputs and equipment from the **suppliers**.
4. As for the **wholesaler**, they must sell their purchases from the previous season on the global market.



Choice of practices



Purchase of know-how



Purchase of equipment and inputs

Stage 2: Harvesting and sales

1. Each **farmer** calculates the impact of the crops and other practices (biofumigation, tool disinfection, etc.) they decided to implement for that season on the level of soil infestation by soil-borne pests and diseases.
2. The **vegetable farmers** harvest their crops. The quantity harvested is influenced by the level of soil infestation and the nature of the crop. The yields of pest-resistant crops are not affected by the level of infestation!



3. The **vegetable farmers** sell their crops to the **wholesaler**. However, the **wholesaler** is constrained by the demands of the global market: even if they do not know these requirements in advance, they can anticipate them and refuse to buy certain crops if they consider that these crops' quantity, quality or variety does not meet market criteria.
4. The **advisor** and **supplier** can create new know-how or inputs to sell to the **vegetable farmers**. They can also move around and communicate with the other stakeholders.

Next season

Roles

Pay particular attention to the role you're about to play, by reading your role card carefully. Each role can be played by one or more players in a team.

Vegetable farmers

Board

1 You are a large vegetable farmer. All your plots count double. For each input, plantlet or seed you would like to use on a given plot, you have to buy and place two of the same input or plantlet/seed cards on this plot. You also harvest double on each plot. You see the soil as a living system that needs to be healthy for your crops to produce well. You don't want to cooperate with other farmers. Your personal goal: make the most profit = earn the most "Buns"

2

4

Calculation of harvest and infestation level

Number of boxes harvested = $\frac{1}{2} \times \text{yield reduction factor}$

- Yield reduction factor: $\times 1/2$, $\times 3/4$, $\times 1/4$ ou $\times 1/4$
- For the same crop on several plots (e.g., melons on plots n^1 and n^2), add up the results of this calculation for each plot
- To calculate the harvest for a double plot, multiply the result by 2
- The number of boxes harvested for resistant crops (scallion, leek's lettuce and tomato) is not affected by the level of infestation. Number of boxes harvested $\frac{1}{2} \times \text{input} = 10$
- The effect of a crop or input on the level of infestation occurs only at the end of the card
- An infested plot can never have an infestation level below 1

Examples:

Case n°1: single plot

5	9
2	4
3	7
4	8
1	6

1st 2nd Total end of season

5+9 2+4 3+7 4+8 1+6

19 13 19 13

Case n°2: double plot

5	9
2	4
3	7
4	8
1	6

1st 2nd Total end of season

5+9 2+4 3+7 4+8 1+6

19 13 19 13

3E4

5

6

7E4

10

$\times 2 =$
double plot

	Year 0	Year 1	Year 2	Year 3
n^1	3			
n^2	2			
n^3	2			

8

9E4

Cyril Langlon's farm

Key

1: Character sheet

2: Key

3: Know-how: this is where vegetable farmers lay down their know-how cards.

4: Calculation tutorial

5: Purse, where players place their buns

6: Trashcan, for unsold produce and unused plantlet cards

7: Equipment available for unlimited use: this is where vegetable farmers place their equipment

8: Infestation level: this is the infestation level that applies to the crop placed in the box below

9: Plot: in this example, there are three. Crop cards are placed in the green boxes, and single-use equipment and services cards in the orange boxes

10: Yield reduction: this is the factor by which crop yield is multiplied according to the level of infestation indicated above

^{E4} Boxes where cards are placed in Stage 1, Step 4 (see the "Actions" sections below)


Role

There are 5 vegetable farmer profiles.



Cyril Langlon
Vegetable farmer

You are a large vegetable farmer. All your plots count double. For each input, plantlet or seed you would like to use on a given plot, you have to buy and place two of the same input or plantlet/seed cards on this plot. You also harvest double on each plot. You see the soil as a living system that needs to be healthy for your crops to produce well. You don't want to cooperate with other farmers. Your personal goal: make the most profit = earn the most "Buns"




Thomas Legoupil
Vegetable farmer

For you, soil is simply a growing medium that can be disinfected and adapted to your plants' growth needs. You don't want to cooperate with other farmers. Your personal goal is to make as much profit as possible = earn as many "Buns" as possible.




Joséphine Rivière
Vegetable farmer

For you, soil is simply a growing medium that can be disinfected and adapted to your plants' growth needs. Your personal goal is to make as much profit as possible = earn as many "Buns" as possible.



Frédéric Chambaud
Vegetable farmer

For you, the soil is a living system that needs to be healthy for your crops to produce well. Your personal goal is to make as much profit as possible = earn as many "Buns" as possible and nurture the life in the soil.



Sophie Langlais
Vegetable farmer

For you, the soil is a living system that needs to be healthy for your crops to produce well. Your personal goal is to make as much profit as possible = earn as many "Buns" as possible and nurture the life in the soil.

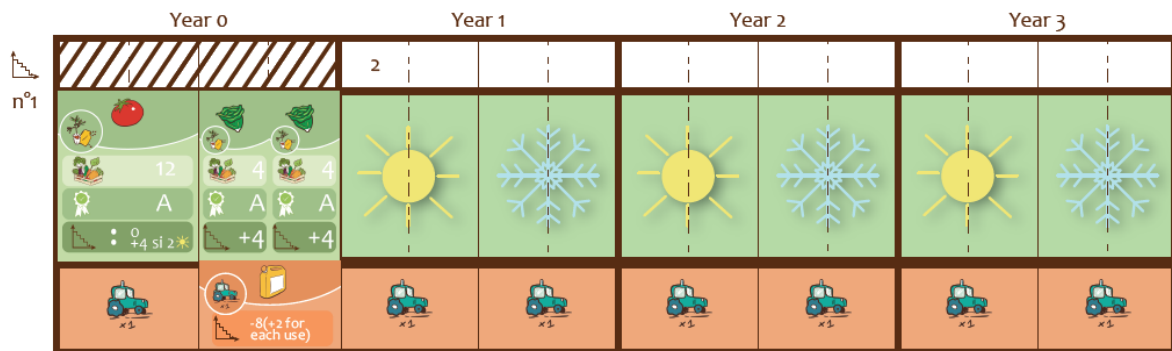
Plot

There are 3 game years, each split into 2 seasons (summer/winter).

Year 0 has already passed. It allows players to learn about the vegetable farmer's previous practices on their plots.

PLEASE NOTE: The game starts in Year 1.

At the start of the game, each vegetable farmer has a certain number of buns, distributed by the facilitator and specified on the vegetable farmer's board (e.g., Cyril Langlon starts with 90 buns).



Year 0: On this plot, tomatoes were grown in summer, followed by two consecutive lettuce crops in winter. Chemical fumigation was carried out in winter. Years 1, 2 and 3 (i.e., 6 seasons) will be completed according to the players' choices.

Actions

Stage 1: Land use and soil cover

Step 1: The vegetable farmer (alone or in a team) establishes their strategy for the current season.

“Which vegetables should I grow this season based on the current state of my soil?”, “Should I fumigate my soil or solarize it?”, “Do I need new knowledge?”

Step 2: If the vegetable farmer wants advice and to acquire new know-how, they approach the technical advisor. They buy the know-how card(s) they need and can afford from the advisor. The technical advisor and the supplier can each also visit vegetable farmers to advise them on techniques and/or inputs.

Step 3: The vegetable farmer buys plantlets, inputs and equipment for the season from the supplier.

Step 4: The vegetable farmer places the cards on the board (see “E4” boxes in the board illustration above).

PLEASE NOTE:

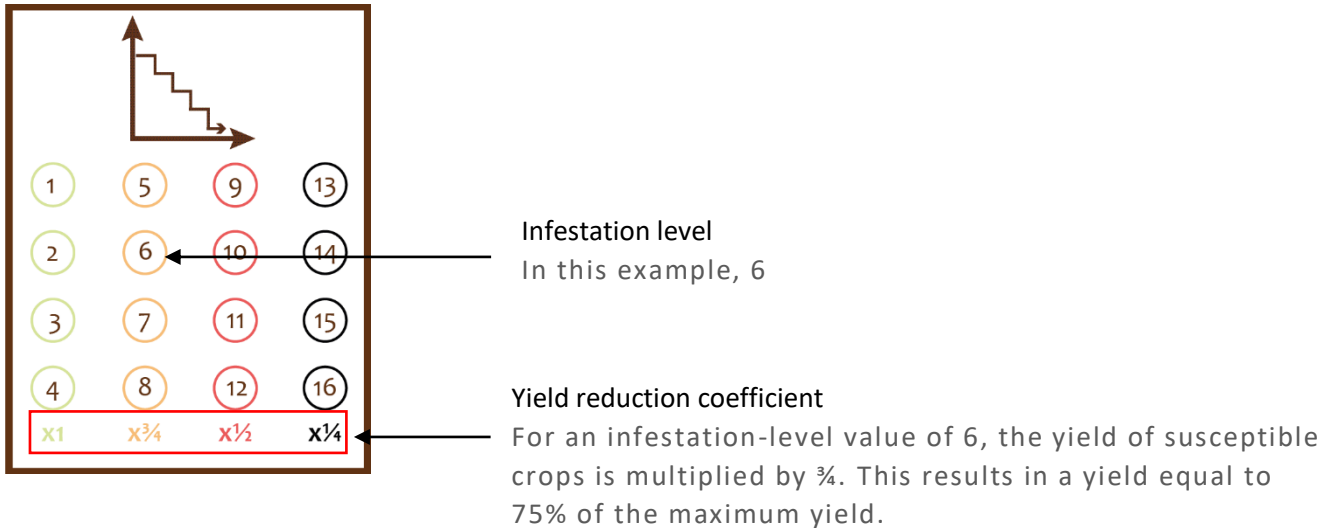
- Seedlings do not keep from one season to the next. If they are not used on the plot immediately after purchase, they must be thrown away! This is not the case for other inputs, services and equipment.
- **It is forbidden to buy products for which the vegetable farmer does not have the know-how.**
- Cyril Langlon has the largest farm with 3 double plots, i.e., 6 plots. All his plots count as double. He must therefore always buy two of each product for each of his plots. He also harvests twice as much.

Stage 2: Harvesting and sales

Step 1: The farmer calculates their level of infestation for each half-season based on the plantlet, seed or input cards they had at the end of the previous half-season. All cards (plantlet, seed or inputs) have an impact on the level of soil health in the half-season following the end of the half-season to which the card applied. This means that a melon crop in the first part of the summer season impacts the soil

health indicator in the second part of the summer, which in turn impacts the yield of the scallion grown in that half-season.

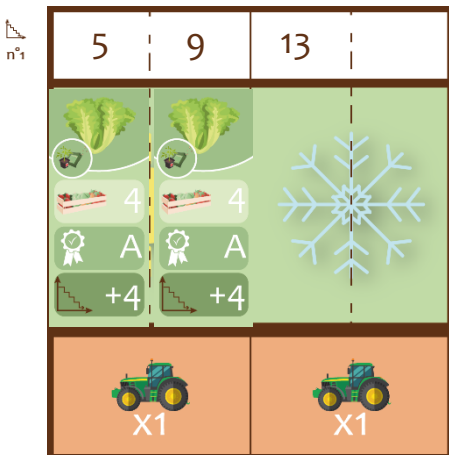
Step 2: The vegetable farmer harvests the crops on their plots. Note that the level of pest infestation in the soil determines its impact on the harvest, but only for susceptible crops! Susceptible crops are those which increase the level of infestation (e.g., melon with +6). Each plot has its own infestation level. This is indicated by the infestation level indicator at the top of the half-season. To find out the quantity of a harvest, multiply the number of boxes to be harvested by the yield reduction coefficient (see the examples on the next page).



Step 3: The farmer sells their production to the wholesaler. The wholesaler can negotiate volumes and prices. If the wholesaler so requires, a harvest card can be split in two to satisfy the quantity requested. For example, a card with 8 boxes of scallion can be split into a card with 5 boxes and another card with 3 boxes. If any crops have not been purchased this season, place their cards in the trashcan on your board.

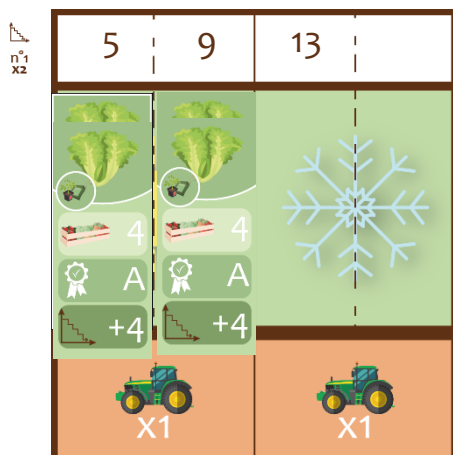
Examples of harvest and infestation-level calculations: in these three cases, the starting infestation level is 5.

Case 1: Half-season crop



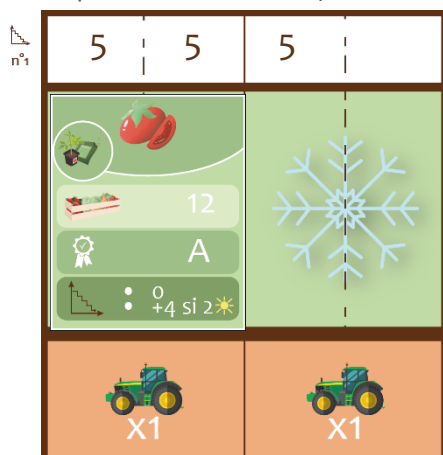
	1 st half-summer	2 nd half-summer	1 st half-winter
Infestation level	5	5 + 4 = 9	9 + 4 = 13
Nb of boxes harvested	4 × $\frac{3}{4}$ = 3	4 × $\frac{1}{2}$ = 2	
Total quantity harvested in the summer	5 boxes of lettuce		

Case 2: Double plot



	1 st half-summer	2 nd half-summer	1 st half-winter
Infestation level	5	5 + 4 = 9	9 + 4 = 13
Nb of boxes harvested	$4 \times \frac{3}{4} \times 2 = 6$	$4 \times \frac{1}{2} \times 2 = 4$	
Total quantity harvested in the summer	10 boxes of lettuce		

Case 3: Whole-season crop (context: no tomatoes grown the previous summer → no impact on tomatoes)



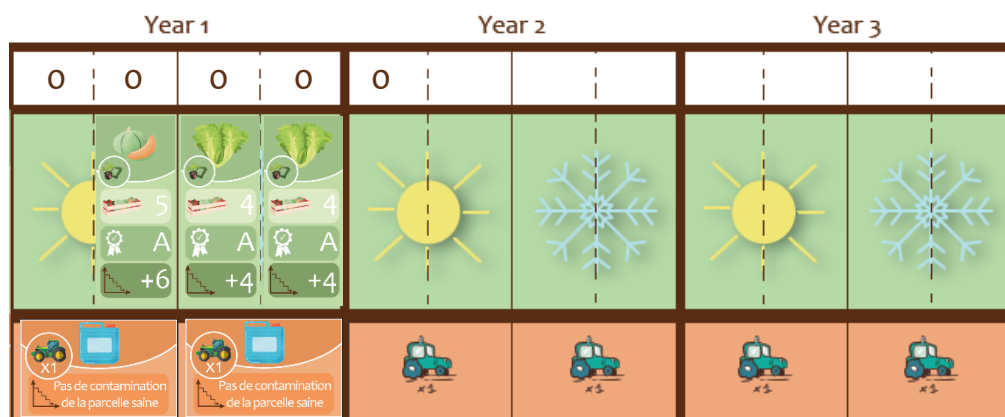
	1 st half-summer	2 nd half-summer	1 st half-winter
Infestation level	5	5	5
Nb of boxes harvested	0	12	
Total quantity harvested in the summer	12 boxes of tomatoes		

Special rules

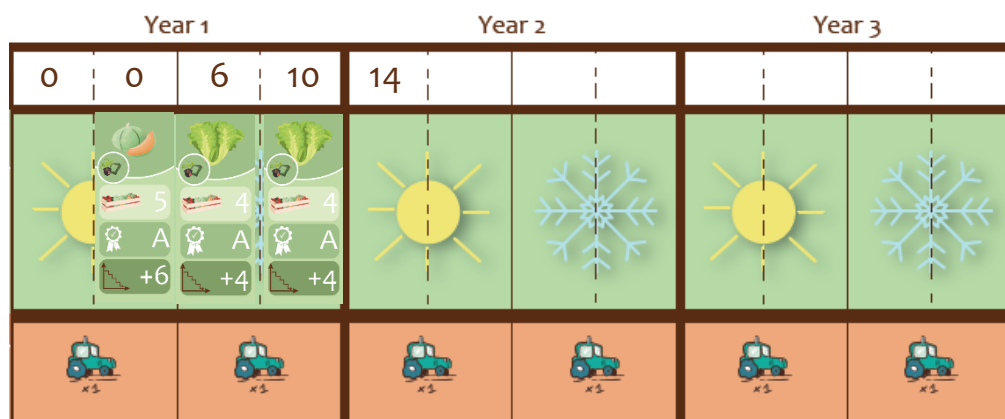
Non-infested plots

An infested plot can **never** return to an infestation level of 0. However, some vegetable farmers have non-infested plots, i.e., plots with an initial infestation level of 0. On these plots, harvests are at their maximum. To avoid infestation of the plot, farmers must disinfect their tools before using them on the plot. If they don't, the infestation level becomes the total of the infestation impact from the crops and techniques of the previous season.

Example of 2 healthy plots:



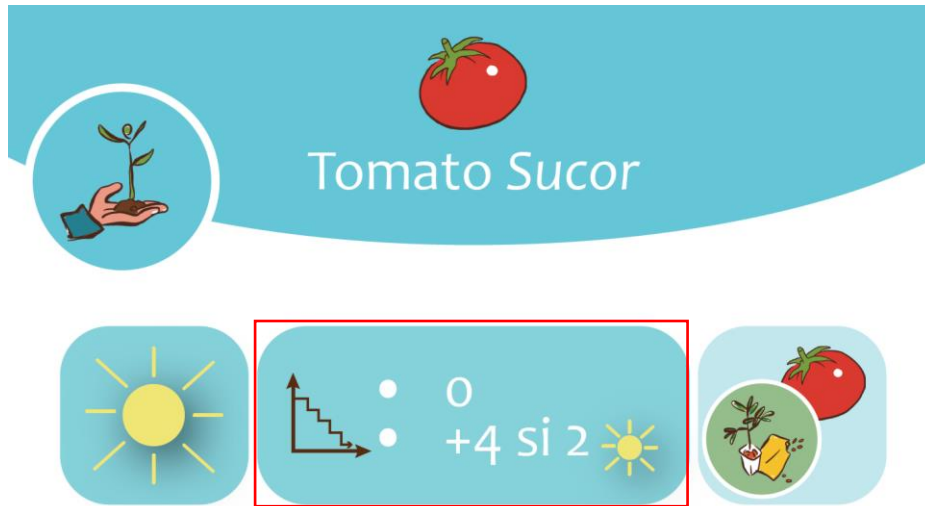
	Summer – Year 1	Winter – Year 1	1 st half of the winter – Year 2
Infestation level	0	0	0
Number of boxes harvested	5 boxes of melons	4 + 4 = 8 boxes of lettuce	



	Summer – Year 1	Winter – Year 1	1 st half of the summer – Year 2
Infestation level	0	1 st half-winter: $0 + 6 = 6$ 2 nd half-winter: $6 + 4 = 10$	$10 + 4 = 14$
Number of boxes harvested	5 boxes of melons	$(4 \times \frac{3}{4}) + (4 \times \frac{1}{2}) = 5$ boxes of lettuce	

Tomatoes

Tomato is a species that is susceptible to nematodes, as it enables them to reproduce. However, in the game, this crop only has an impact on soil infestation levels **if it is grown for two consecutive summers**. This is because all tomatoes grown carry the same nematode resistance gene. When tomatoes are grown too often, nematode populations bypass this resistance gene and develop.



Tomato know-how card


Example: Placing tomato plantlet cards on the plot two summers in a row

Year 1		Year 2			Year 3	
5	5	5	5	1	1	5
12 A 0 +4 if 2*	4 A -5	12 A 0 +4 if 2*				

	Summer – Year 1	Winter – Year 1	Summer – Year 2	1 st half-winter – Year 2
Infestation level	5	5 + 0 = 5	5 – 5 = 1 (a contaminated plot never returns to 0)	1 + 4 = 5
Number of boxes harvested	12 boxes of tomatoes	4 boxes of scallion	12 boxes of tomatoes	

Technical advisor Board

1




KnowCulture Technical advisor

You want to help vegetable farmers to implement the best practices while respecting their existing marketing channels, their outlets and the available inputs.
You sell know-how to farmers and can collaborate with the input supplier to develop new know-how and inputs.
You need to remind farmers who acquire new knowledge that they need the required inputs, service provision and/or equipment in order to implement the practice they just learned.

Your personal goals :

- Support vegetable farmers in making the maximum profit.
- Make yourself a maximum of profit = earn a maximum of «Buns».

2



Soil infestation level

Know-how

Winter

Single-use service/input

Summer


Equipment for unlimited use

Harvest

Plantlet/seed

Quality

3



= 1

= 5 =

Start : 30 buns

Technical advisor's

Key

1: Character sheet

2: Key

3: Purse, where players place their buns

The advisor has a **catalog of practices** to help them support the vegetable farmers whom they advise.

Actions

Stage 1: Land use and soil cover

Step 1: The technical advisor (alone or in a team) listens to and advises the vegetable farmers on their know-how needs. He or she answers questions, using the catalog of practices as a guide, but can also proactively approach vegetable farmers by moving around the room.

Step 2: They sell the know-how to the vegetable farmers.

Although the advisor is there to help vegetable farmers manage their business, they must also secure an income through the sale of know-how.

Stage 2: Harvesting and sales

Step 1: The advisor checks that all vegetable farmers are only using techniques for which they have the know-how.

The advisor may use this time to support farmers and/or create new know-how cards. The creation of a new type of know-how involves a fee: the farmer wishing to create this know-how must call the game facilitator, submit their idea, and pay 50 buns. The creation of new cards is not mandatory. The next steps relate to the creation of new cards.

Step 2: If the idea is approved by the facilitator, the advisor takes 5 blank know-how cards and writes on them the characteristics of the new know-how to be created. The 5 cards must be identical.

Step 3: The facilitator approves the cards and places them on the commercial area of the board: they become available for sale.

If the advisor and the supplier join forces to create a know-how card and its corresponding plantlet/seed, input/service, or equipment card, then the cost of creating the two cards is 70 buns, to be split between the two players.

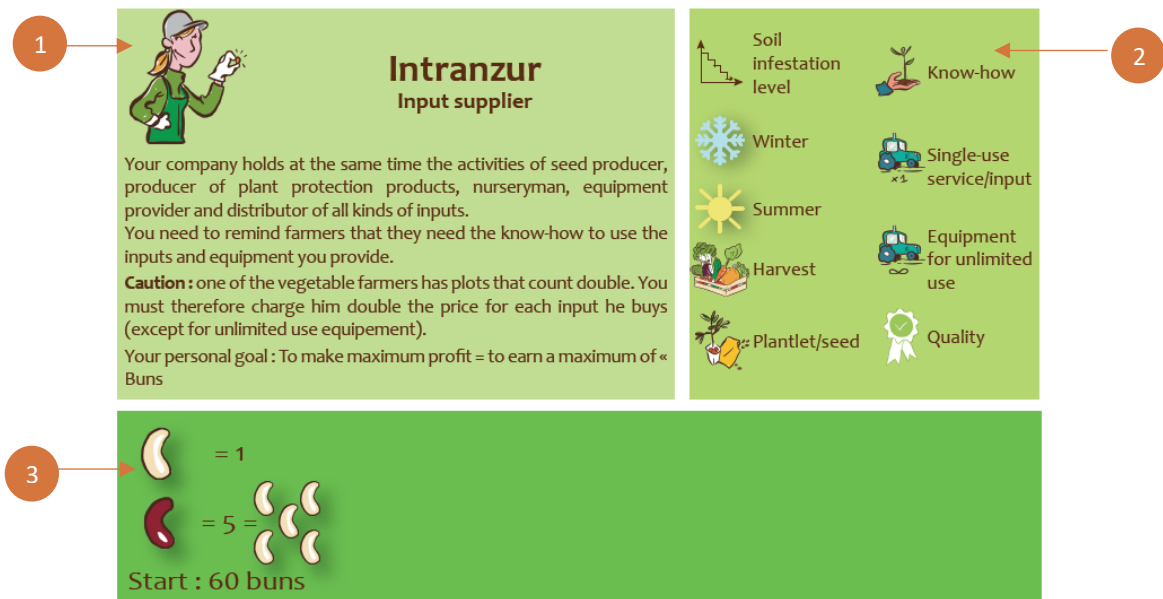
At the end of each year, the advisor pays an operating fee of 40 buns to the bank (the facilitator).

The game is open. If you have an idea for an action but don't know how to carry it out in the game, talk it over with the facilitator! You can also move around and chat with other players.

The advisor must read the "Introduction to practices" section below.

Supplier

Board



Board of the supplier of inputs and equipment

Key

1: Character sheet 2: Key 3: Purse, where players place their buns

The inputs and equipment supplier has a catalog detailing the plantlets, inputs and equipment that they sell. They can rely on this catalog to answer vegetable farmers' questions.

Actions

Stage 1: Land use and soil cover

Step 1: The supplier (alone or in a team) sells their products to the vegetable farmers. They are a good salesperson who knows how to sell as many products as possible! However, they cannot change the price of their goods.

Stage 2: Harvesting and sales

The supplier can use this time to organize their communication and/or to communicate with other players (advertising, partnerships). They can also create new cards (see the steps below).

Step 1: The supplier can create new plantlet/seed, inputs cards/services or equipment. However, there are costs involved. You must therefore call the facilitator and pay him 50 buns. The creation of new cards is not mandatory.

Step 2: The advisor takes at least 6 blank cards and writes on them the characteristics of the new element to be created. All cards must be identical.

Step 3: The facilitator validates the cards and places them on the commercial area of the board (box or carton).

If the advisor and supplier join forces to create a know-how card and its corresponding plantlet/seed or input/service or equipment card, then the cost of creating the 2 cards is 70 buns, to be shared between the two players.

The game is open. If you have an idea for an action but don't know how to carry it out in the game, talk it over with the facilitator! You can also move around and communicate with other players.

The supplier must read the following section "Introduction to practices".

Wholesaler

Board

The Wholesaler's board is divided into several sections:

- 1: Character sheet:** VeggieLand Wholesaler. You buy your products from vegetable farmers according to 3 criteria:
 - Your existing markets,
 - The quality you require,
 - The price.
 The price indicated on your board is only a "reference price". You are free to negotiate. But beware of time: if you haven't bought by the end of the round, you will have nothing to sell... Your personal goal is to make as much profit as possible = earn as many "Buns" as possible.
- 2: Key:** A central area with icons for Soil infestation level (Winter, Summer, Harvest), Know-how, Single-use service/input, Equipment for unlimited use, Plantlet/seed, and Quality.
- 3: Purse:** A green box containing a pile of buns. Start: 300 buns. Icons show 1 bun = 1 and 5 buns = 5.
- 4: Trashcan:** A green box containing a trashcan icon.
- Crop Cards:** A grid of purple boxes for Scallion, Melon, and Lettuce. Each card shows minimum quantity, price per box, and required quality.

Wholesaler's board

Legend

- 1: Character sheet
- 2: Key
- 3: Purse, where players place their buns
- 4: Trashcan: unsold crops are placed in the trashcan
- 5: Purchased crops: the crop cards purchased are placed in the corresponding purple box.

Actions

Stage 1: Land use and soil cover

Step 1: The wholesaler sells their previous season's purchases on the global market. To do so, they count the total number of boxes they have for each crop.

Step 2: To sell their products, the wholesaler refers to the criteria displayed on the Global Market board for the corresponding year and season. If they bought lettuce from vegetable farmers during the summer, they should refer to the global market's summer requirements for lettuce. Please note

that for each product (whatever its quality), the wholesaler must respect the minimum and/or maximum quantities specified on the board. For instance, if the maximum is 9 lettuces, but the wholesaler has 8 boxes of Quality-A lettuce and 6 boxes of Quality-B lettuce, they cannot sell 5 lettuces. If they have too much of one product, they may split a harvest into two cards to match the maximum quantity.

They place the redeemed cards on the Global Market board and collect the quantity of buns owed to them from the global market's bun stock.

Step 3: The wholesaler places the crop cards they haven't been able to sell in the trashcan on their board.

Step 4: New value chains can be created. However, it involves a fee. To create a new value chain, the wholesaler must call the facilitator and pay 50 buns. The creation of new value chains is not mandatory.

Step 5: The wholesaler writes the criteria of this new value chain in the blank boxes on their board.

Stage 2: Harvesting and sales

Step 1: The wholesaler buys the vegetable farmers' crops. They buy according to the requirements indicated on their board. The wholesaler can only buy crops that are in season! For example, they can't buy tomatoes and melons in winter.

During this stage, the wholesaler is not allowed to look at the Global Market board.

Step 2: The wholesaler places the crop cards purchased in the corresponding boxes on their board.

The game is open. If you have an idea for an action but don't know how to carry it out in the game, talk it over with the facilitator! You can also move around and chat with other players.

Global market Board

1 **GlobalMarket**

Your primary aim is to satisfy end-consumer demand.

3 = 1
= 5
Unlimited amount of buns

2 Your personal goals respecting the rules of the market (price, maximum entry volume, minimum purchase volume):

4

	Year 1	Year 2	Year 3
Scallion	2,5 /box Required quality : A Minimum amount: 8 Maximum amount: • 16 • 16	2,5 /box Required quality : A Minimum amount: 8 Maximum amount: • 16 • 16	2,5 /box Required quality : A Minimum amount: 8 Maximum amount: • 16 • 16
Lamb's lettuce	1,25 /box Required quality : A Minimum amount: 10 Maximum amount: • 20 • 24	1,25 /box Required quality : A Minimum amount: 10 Maximum amount: • 20 • 24	1,25 /box Required quality : A Minimum amount: 10 Maximum amount: • 20 • 24
Melon	2,25 /box Required quality : A Minimum amount: 12 Maximum amount: • 50	2,25 /box Required quality : A Minimum amount: 12 Maximum amount: • 50	2 /box Required quality : A Minimum amount: 12 Maximum amount: • 50
Lettuces	1,25 /box Required quality : A Minimum amount: 12 Maximum amount: • 70 • 100	1 /box Required quality : A Minimum amount: 12 Maximum amount: • 70 • 100	1,25 /box Required quality : A Minimum amount: 12 Maximum amount: • 70 • 100
Tomato	1,25 /box Required quality : A Minimum amount: 36 Maximum amount: • 300	1,25 /box Required quality : A Minimum amount: 36 Maximum amount: • 300	1,25 /box Required quality : A Minimum amount: 36 Maximum amount: • 300
_____	_____ /box Required quality : _____ Minimum amount: _____ Maximum amount: • _____ • _____	_____ /box Required quality : _____ Minimum amount: _____ Maximum amount: • _____ • _____	_____ /box Required quality : _____ Minimum amount: _____ Maximum amount: • _____ • _____

5

Global Market board

Key

1: Character sheet

2: Key

3: Purse, where players place their buns

4: Purchased crops: the crop cards purchased are placed in the corresponding purple box.

5: Table of purchasing criteria, indicated for each year. Outside the sales stages, an A3 sheet is used to hide the data.

Actions

The global market is an automated role interacting mainly with the wholesaler. Outside of the sales stages, an A3 sheet is used to mask the data featuring on it.

Stage 1: Land use and soil cover

On the global market, the wholesaler sells vegetables purchased from the farmers during the previous season. He or she complies strictly with the price indicated, the quantity constraints (minimum and maximum), and quality constraints.

Introduction to practices

This part is for the **inputs and equipment supplier and the technical advisor**.

In *The Key to Soil*, players are required to implement practices with varying degrees of alignment with agroecological principles. The advisor and the supplier are the reference persons who both understand these practices, since they pass on the corresponding know-how, and know the inputs, services and equipment needed to apply the practices.

This section therefore provides the advisor and the supplier with the necessary knowledge on the practices that feature in the game.

Steam disinfection

The diffusion of steam in the soil to eradicate large numbers of nematodes. This practice is highly effective on the top layers of soil, but it is very energy-intensive and non-selective (the majority of living organisms in the soil are destroyed, including beneficial ones).

This practice does not align with the principles of agroecology!

Chemical fumigation

The spraying of synthetic nematicides (products derived from synthetic chemistry), which will eliminate not only root-knot nematodes, but also a large part of the soil's biological life. The effectiveness of this practice on root-knot nematodes diminishes with repetition, as the nematodes develop resistance.

This practice does not align with the principles of agroecology!

Biocontrol

A plant protection practice based on natural mechanisms. It aims to protect crops by leveraging mechanisms and interactions that govern the relationships between species in the natural environment.

Examples: introducing natural predators of nematodes, using synthetic pheromones to confuse pests, etc.

Sorghum trap crop

Sorghum is a cereal that is particularly susceptible to root-knot nematodes. As a result, many nematodes will lodge in its roots. For this crop to be a nematode trap, sorghum must be destroyed before the females lay their eggs outside the roots. This traps the nematodes in the roots and reduces the number of nematodes in the soil.

Cultivation of a vetch-oats mix

A mixture of legumes and cereals of which the biomass, once returned to the soil, stimulates root-knot nematode antagonists.

Tool disinfection

The disinfection of tools between uses on different plots to avoid contaminating non-infested plots.

Application of fermentable organic matter

The spread of non-composted organic fertilizer on a plot using a spreader. The decomposition of this "active" organic matter will release gases harmful to root-knot nematodes and stimulate their antagonists.

Solarization

Gentle pasteurization using a transparent plastic sheet applied to damp soil for 45 to 60 days, in the second half of summer. Solarization greatly reduces the root-knot nematode population, but also affects its antagonists.

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