

Seed System

Design Goals

- Explore expanding upon the existing crop growing systems to require Seeds to plant crops
 - Define the necessary design components of the seed system
- Analyze the core design of Seeds
 - Verify it adds interesting mechanics, expands the player narrative, and identify problems with the system
- Present solutions to the identified problems with the core design
- Ultimately come to a decision on whether or not Seeds are worth adding to Rimworld

Core Design

Summary

- Seeds are integrated into the **crop growing system**
 - Crops must produce a yield that can be converted into seeds
 - Seeds must be required to plant crops
 - Colonists convert crop yields to seeds at a stove
- Seeds are added to the **starting items and trade systems**
 - Players need to start with some seeds
 - If players do not start with all seeds, the seeds they do not have must be collectable through trade
- Seeds are added to the **Grow Zone** and **Storage Zones**
 - Colonists plant seeds in a grow zone
 - Seeds must be separate, interactable objects
 - Seeds must be able to be stored in storage zones

Details

Seeds in the Crop Growing System

- Questions
 - Why do seeds need to be converted from a harvested yield?
 - If harvested crops automatically provide seeds in addition to a yield, players do not have any interaction or decision to make when it comes time to plant their crops
 - If harvested crops do not provide seeds, this would drastically affect the balance of food in Rimworld

- Summary
 - There is a unique seed for every plant that players can grow in a Grow Zone in Rimworld
 - Seeds are required to grow a plant in a Grow Zone
 - Harvested plants produce a yield that can be converted into seeds

- Seeds to be implemented
 - Current in game plants



- Each of these plants should have a unique seed
- Art required
 - Unique seed icons for Grow Zone plants that can be used in the UI and as the interactable model
 - Visual design
 - Each unique seed icon/model should be modeled after the real world seeds for these plants
 - If there are no real world examples (ie fibercorn, healroot, etc.) they should resemble their closest real world counterpart but be distinctly unique
 - Some seeds should be visually categorized to look similarly to reduce the burden on the player of recognizing many seed types
 - For example, flowers (dandelion, daylily, and roses) should have similar seed icons as they all serve a similar purpose
- Yield to Seed Conversion
 - All plants growable in a grow zone can be converted into seeds
 - Plants with a yield (aka harvestable plants)
 - The yields from plants can be converted into seeds

- Each plant has a unique amount of its yield required to produce one or more seeds
- Seeds are produced by colonists at a stove
 - Each seed type below will be added to the Bill section of the stove



	Harvest Yield	Grow Days	Yield to Seed Ratio	Seeds per harvested plant	Seeds per Grow Day
Cocoa Tree	20	16	14:1	1.429	0.089
Corn Plant	22	11.3	2:1	11	0.973
Cotton Plant	10	8	3:1	3.33	0.417
Devilstrand Mushroom	6	22.5	2:1	3	0.133
Fibercorn	2	6	1:1	2	0.33
Haygrass	18	7	5:1	3	0.514
Healroot	1	7	1:2	2	0.286
Hop Plant	8	5	5:1	1.6	0.32
Nutrifungus	11	6	2:1	5.5	0.917
Potato Plant	11	5.8	2:1	5.5	0.948
Psychoid Plant	8	9	5:1	1.6	0.178
Rice Plant	6	3	2:1	3	1
Smokeleaf Plant	9	7.5	5:1	1.8	0.24
Strawberry Plant	8	4.6	2:1	4	0.87

Tinctoria	1	2	2:1	0.5	0.25
Toxipotato Plant	7	4.9	1:1	7	1.429

- Plants without a yield
 - If a plant does not have a yield, seeds are dropped periodically from the plant once it is fully grown
 - These dropped seeds simply appear next to the plant

	Grow Days	Lifespan	Seed Drop Rate	Seeds per Plant
Dandelions	2.5	20	Every 4 Days	5
Daylily	1.5	4.5	Every Day	4.5
Rose	1.5	7.5	Every 2 Days	3.25

Seeds in the Starting Items and Trade Systems

- Questions
 - Why do seeds need to be included in the starting items and trade systems?
 - If seeds are produced by growing crops, players need a method to collect seeds before they can grow crops
 - Players also need a method to select starting seeds because players may view some seeds as absolutely essential to a colony in a difficult biome (ie fibercorn for an extreme desert or Toxipotatos for a polluted area)
 - The most basic ways to introduce seeds to the player without upsetting the early game balance is by starting them out with some seeds and making the remaining seeds available through traders
- Starting Seeds
 - Base Starting Seed Values
 - These values are the base seed amounts to used to calculate the number of seeds colonies can start the game with, colonists can be generated with, and traders can have in their inventories

Food Type Seeds	Seed Type	Amount of Seeds
Corn Plant	Food	10 - 30
Nutrifungus	Food	10 - 30
Potato Plant	Food	10 - 30

Rice Plant	Food	10 - 30
Strawberry Plant	Food	10 - 30
Toxipotato Plant	Food	10 - 30
Cocoa Tree	Miscellaneous	1 - 3
Cotton Plant	Miscellaneous	5 - 10
Dandelions	Miscellaneous	10 - 30
Daylily	Miscellaneous	10 - 30
Devilstrand Mushroom	Miscellaneous	5 - 15
Fibercorn	Miscellaneous	25 - 40
Haygrass	Miscellaneous	20 - 35
Healroot	Miscellaneous	5 - 10
Hop Plant	Miscellaneous	5 - 10
Psychoid Plant	Miscellaneous	3 - 8
Rose	Miscellaneous	10 - 30
Smokeleaf Plant	Miscellaneous	3 - 8
Tinctoria	Miscellaneous	10 - 15

- Seeds are given to the player at the start of a new colony
 - Players are guaranteed 1 randomly chosen Food type seed and 1 randomly chosen Miscellaneous type seed
 - The amount of each variety of seeds the player receives is equal to 1x the Base Starting Seed Values
 - After a player selects their colonists, seeds are then randomly assigned to their drop pods when the colony begins



- - Colonists can be generated with seeds in their possessions
 - Generated colonists have a chance to start with a randomly selected seed in their possessions
 - The chance of having seeds in their possessions is increased if
 - The colonist has a high Plants level
 - The colonist has a passion for Plants
 - The colonists Growing level is modified by their backstory

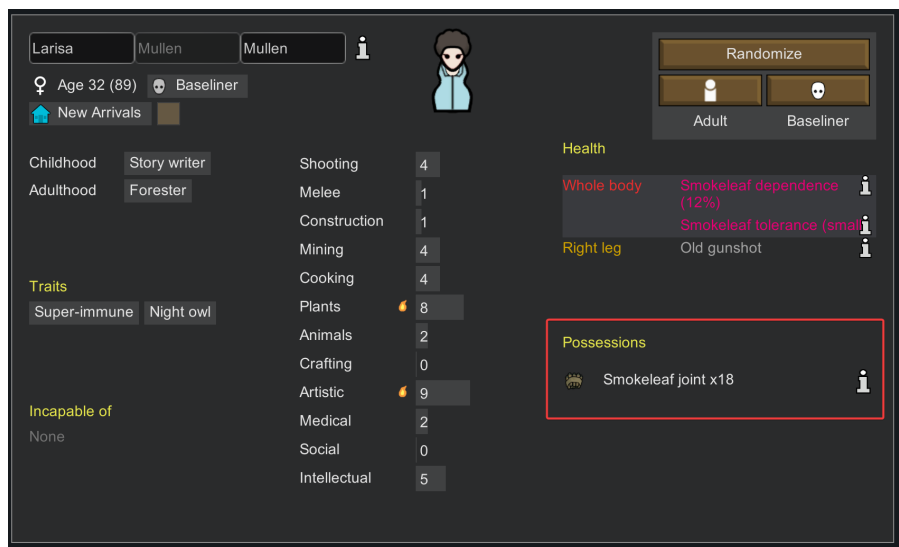
	Chance Increase
Base	+5%
Per Plants Level	+2%
Per Plants Passion Level	+4%
If their backstory modifies their Plants level	+10%

- Example: This generated colonist has 10 Plants, 1 passion for Plants, and a backstory that modifies his Plants level.

The odds he has a seed in his possessions is 45%



- If a colonist is generated to have seeds in their possession, they should have a randomly selected single plant variety .5x the Base Starting Seed Values



- Seeds in the Trade System
 - Seeds must be collectable after the starting seeds are selected for the player
 - First Wanderer to enter the map
 - In the very early stages of a new colony, there is always a wanderer that is available for trade
 - This wanderer should always have a seed variety available for trade
 - The seed available for trade should be a seed that a player does not currently have
 - The wanderer should have .75x the Base Starting Seed Values
 - This is to give players another chance to customize their early game seed options
 - Subsequent Traders can have a chance of having seeds in their inventories

- Traders have a 50% chance to have 1 seed variety, 25% to have 2 seed varieties, and 25% to have no seed varieties

Trader	Potential Seeds
Bulk Goods Trader	All
Combat Supplier	None
Exotic Goods Trader	All
Shaman Merchant	All
Slaver	Hops, Psychoid, Smokeleaf
War Merchant	None

- The number of tradeable seeds the trader has is 1.5x the Base Starting Seed Values

Seeds as Interactable Objects

- Grow Zones
 - Grow Zones function identically to how they currently do in game with a few changes
 - Seed Mechanics
 - It takes 1 seed to plant 1 square of a plant
 - When the plant is planted, 1 seed is consumed from the Colonist's inventory
 - The "work time" required for a colonist to plant a seed is unchanged from planting a plant without a seed (before the seed system)
 - AI Logic
 - When the desired seed for planting exists on the map
 - Colonists travel to the seed associated with the plant (ie a strawberry seed for a strawberry plant), pick it up, and perform an action to plant it in the grow zone
 - Colonists can carry up to 25 seeds at a time
 - Note, the amount of carryable seeds should be an easily configurable stat
 - When the desired seed for planting does not exist on the map
 - The colonists ignore planting this crop
 - UI Changes
 - If the player selects a colonist and **right clicks** the grow zone for a crop they do not have the seed for, the prioritize action button is disabled



- Storage Zones
 - Storage zone filters need seeds added to them



- Seeds can have 50 seeds per stack
- Seeds can be placed on shelves
- Seeds do not need to be refrigerated

Analysis

Analysis Weighting

- 5 - One of the most important impacts this will have on the game. It will noticeably affect every player

- 4 - A big impact on the game. Many players' experiences will be altered
- 3 - A noticeable impact on certain game systems or a small impact on a relatively large swath of players
- 2 - Some effect on the game. It will affect a small number of players or the players that are affected will barely notice
- 1 - Not much of an effect on the game. It's worth mentioning to make sure it's recorded in writing

Core Design Analysis

- (5) Converting Yield to Seeds
 - Introduces an interesting new player decision of how many of their crops they want to convert into seeds
 - This decision is based around the question "How much food do I need now and how many seeds do I need to replant for the next crop cycle?"
 - The in moment decision of how many crops to convert to seeds is interesting, however, long term investment in seeds doesn't feel inherently rewarding
 - Running out of seeds is a problem for the player to solve, having enough seeds next crop cycle would be viewed by the player as the norm
 - Solution: I don't think this problem is totally solvable. We can add more seeds/plants to the late game that players have to slowly acquire seeds to harvest regularly to remind players how much they worked to build their food security.
 - Crops, ranching, and hunting all currently have a low complexity and cognitive load. Adding complexity to the crop system increases this cognitive load beyond the current bounds
 - Increased cognitive load on a simple yet essential system could prove to pressure players too much, especially in the early game when some players are learning how to play
 - Converting seeds from yield also obfuscates how much food the player actually has
 - Solution: Increasing complexity is going to increase cognitive load. This is unavoidable.
 - Plants that produce drugs have a lower seed scarcity than food plants in this design. This has potential to create interesting barriers to overcome with a nonessential section of the crop system
 - Drugs aren't necessary to grow in Rimworld and have a couple primary, though mostly optional, functions
 - Maintain the mood of colonists, including those who are addicted to drugs
 - Sell as a cash crop
 - Overcoming more restrictive barriers to growing drugs en masse, beyond current gating mechanisms (drug labs, required research, and

- preparation), could be a rewarding experience for players without pinching players too hard for food in the early game
- (4) Worldbuilding and Narrative
 - Adding seeds helps enhance the in world narrative for plants
 - Plants no longer magically grow from nothing
 - Adding seeds strain or break the world narrative for other systems
 - If crops require seeds and no longer magically grow from nothing, why don't guns require bullets? Why don't housed animals need to be fed? Why don't colonists drink water? Etc.
 - Solution: Adding seeds in general is going to cause this issue. There's not a way to avoid it.
 - The new stories we are adding to Rimworld with the seed system are okay but they aren't interesting enough
 - Examples of stories Rimworld's grow/crop system already tells
 - Endless drought, desperate foraging, unlucky coldsnap, a lucky migration nearby your base, and a fire destroying your crop
 - Examples of stories the seed system tells
 - Not enough seeds for next crop cycle, I lost all plants but 1 due to a blight and I have to build back slowly, desperately leaving home to start a new colony with a sack of heirloom seeds
 - Solution: The seed system needs more content and to touch more systems to tell more stories.
- (3) Starting Seeds
 - Starting colonies with different seeds gives players a fresher experience by changing what food they can grow from colony to colony
 - Letting players "select" their starting seeds gives them more agency in deciding their own game difficulty
 - Players "select" seeds by purchasing seeds from the initial wanderer or selecting colonists with seeds in their possessions
- (1) Seed Storage
 - Micromanaging seed storage doesn't add anything new or interesting to Rimworld
 - Solution: Make them all stack in a special building, such as a silo, where players can almost endlessly add all seeds to it.
- (1) Trading Seeds
 - Seeds add value to traders and encourages players to engage with the trader system
 - Trading away seeds can also be an interesting decision
 - "Do I sell these seeds now and risk not having enough food later?"

Conclusion

A seed system has the potential to add unique stories to Rimworld, give players a fresher repeat early game experience, and to create interesting new decision points. There are,

however, two issues with a seed system: (1) seeds inherently affect the grow system which is an essential early game system that is risky to modify and (2) the stories Rimworld can tell with seeds aren't interesting enough to warrant the risk this system poses. Essentially, the risks outweigh the rewards.

Players rely on the simplicity of the grow system to jump into understanding some of the essential systems quickly. The hunting and ranching systems are also very straightforward for this reason. The essential nature and early game demand for the grow system means it needs to provide a small cognitive load. Increasing the complexity will also have a larger than usual cascading effect on the rest of Rimworld's economies. The risk for this system could most easily be mitigated by shifting the complexity to affecting the mid/late game but that would be impossible for seeds.

If the risks are high, then the rewards must be even higher to warrant a system like this. I would argue, however, there simply aren't enough interesting aspects of the system to justify the risks. To make this interesting enough, I think we would need to add several of the ideas from the "Other Ideas" section below but that generates a new issue. If this system carries this much risk and we'll have to do even more work to make those risks worth it, surely there's another system we can add to Rimworld that carries fewer risks and more interesting stories to tell.

At the end of the day, the risks of the large increase in early game complexity, the increase in cognitive load, the realignment of the world narrative from the player perspective, and the lack of interesting new player driven stories are just too big to justify moving forward with this design.

Other Ideas

- Instead of seeds being stored in a storage zone, seeds are stored in a mass storage building (ie a silo or barrel)
- Seeds could be added to the ranching system, creating a more complex food system to raise ducks, chickens, or other seed eating animals
- Add seeds to the crafting system (ie craft a baby rattle with wood and seeds, craft a bird feeder that attracts seed eating animals onto the map)
- Seeds are harvested from the map, similarly to how colonists forage for berries
 - Plants generated on the map for seeds would vary based on the biome
- At the start of a colony, seeds could be given to the player in a variety of new ways
 - Based on ideology, starting biome, or starting scenario
- Players can grow things plants cannot naturally grow (ie walls, floors, units, leather, stone chunks, etc.)
- Expand seed system into the Biotech DLC, allowing them to be cross bred and genetically modified
- Expand seed system into the Ideology DLC, creating new religions that utilize seeds in some way (ie preferring to eat seeds, worshiping seeds, using seeds in rituals, etc.)
- Expand the seed system to wild plants including trees