Table

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| **Process** | **Explanation** |
| Consuming | Locust eats grass (food) and gets energy, patch loses that energy |
| Grow back | Grass grows constantly, with the same speed. It can be adjusted. |
| Moving | Each move of locust would cost its energy. Each individual is moving. None is stationary. But the step is based on type. |
| Gregarization | If locusts cluster, they would transform from solitary type (coloured by green) to gregarious (coloured by yellow), vice versa. |
| Death | If the energy of a locust is 0, it would die. |
| Breed | If locusts have enough energy, they will cost energy to give birth to child. |

Photo

Table

Description automatically generated

table

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| AGENT | NAME | MEANING | RANGE |
| patches | n-patches | The density of patches that contain energy | [0,100] |
| maximum\_energy\_grass | The maximum value of energy that each patch could have. The energy would be allocated to each patch randomly within the range. | [1,5] |
| growback\_speed | The number of energies that each patch can grow at each tick. | [0,0.5] |
| turtles | initial\_pop | The initial population of the locust group | {200,500,1000} |
| initial\_energy\_locust | The initial energy of each locust. (When the current energy of a locust has 5 times of it, it would breed.) | {3,4} |
| num\_gregarious | For an individual locust, the sum of the number of locusts in the surrounding 8 patches and in the patch where this locust stays at. | {5,6,7,8,9,10} |
| move\_energy | The energy cost to move each time  (2 times of it is the energy cost of having offspring.) | {1,2} |
| step\_gregarious | The forward step of gregarious | {2,3} |

photo

Table

Description automatically generated

table

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| --- | --- | --- | --- | --- | --- | --- |
| **Fertility Level** | **Low** | **High** |  | **Locust Variable** | **Small** | **Large** |
| n-patches | 60 | 100 | initial\_pop | 500 | 1000 |
| maximum\_energy\_grass | 3 | 5 | initial\_energy\_locust | 3 | 4 |
| growback\_speed | 0.3 | 0.5 | (the energy would allow reproduce) | >= 3 x 5 = 15 | >= 4 x 5 =20 |
|  | | | move\_energy | 1 | 2 |
| (cost of breed =  2 x move\_energy) | 1 x 2 = 2 | 2 x 2 = 4 |
| step\_gregarious | 2 | 3 |

Photo

Table

Description automatically generated

diagram

photo

Chart, line chart

Description automatically generated

diagram

photo

Chart, line chart

Description automatically generated

Plot

photo

Chart, bar chart

Description automatically generated

diagram

Photo

Chart, line chart

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