PLANT GROWING SIMULATION

The **Skeleton Program** accompanying this **Preliminary Material** is a program for the simulation of plants growing.

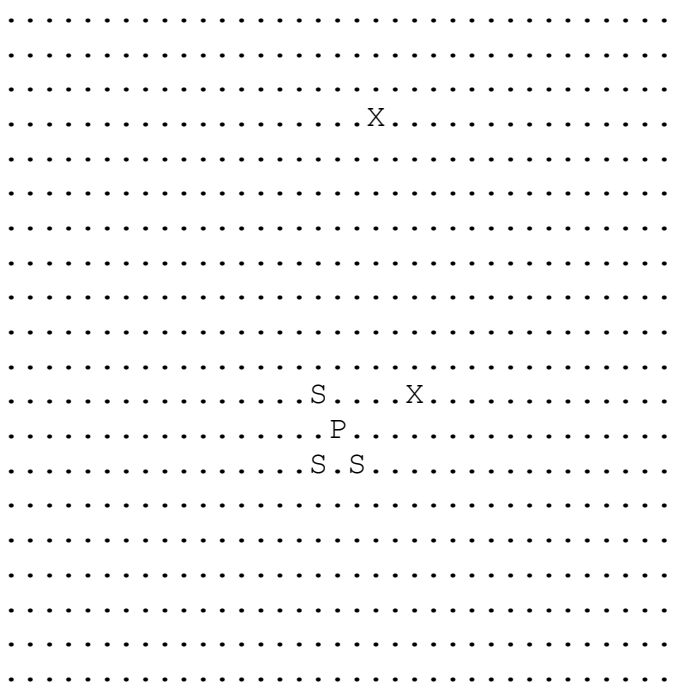
A plant scientist wants to use a computer to simulate how a specific plant will propagate over several years.

The field in which the plant is to grow and propagate is represented as a rectangular grid of cells. A cell can contain just soil, a plant, a seed or rock. It will always contain only one of these.

- If a cell contains just soil, then the cell is represented by `'.'`
- If a cell has a plant growing in it, the cell is represented by `'P'`
- If a cell contains a seed, then the cell is represented by `'S'`
- If a cell contains rock, then the cell is represented by `'X'`

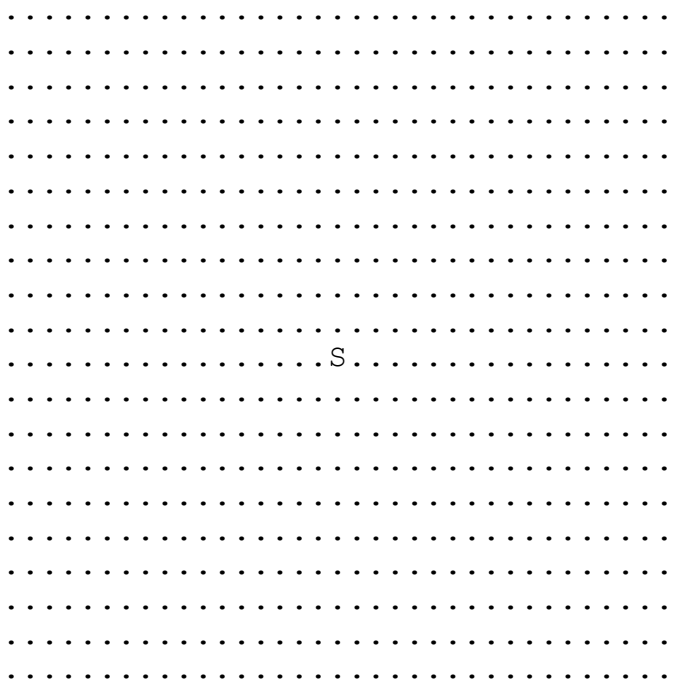
Figure 1 is an example of a field model.

Figure 1



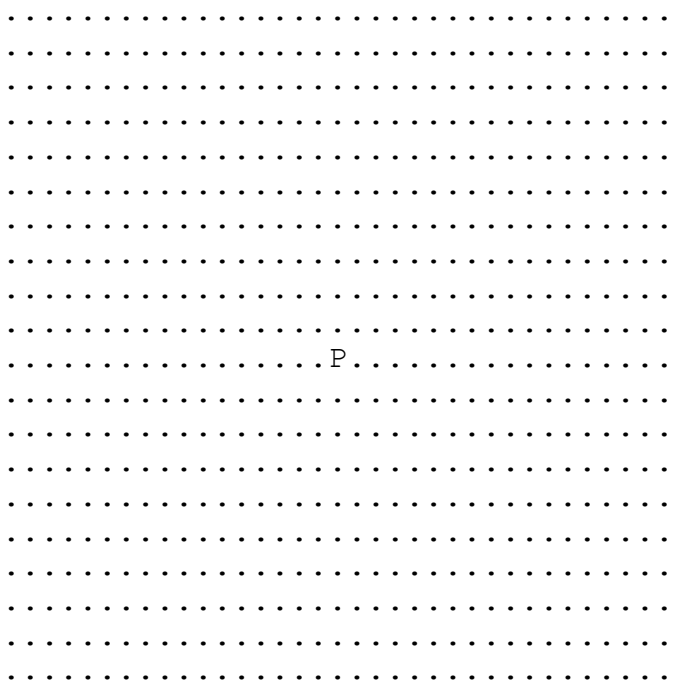
A new field starts with a seed in the middle of the field as shown in **Figure 2**.

Figure 2



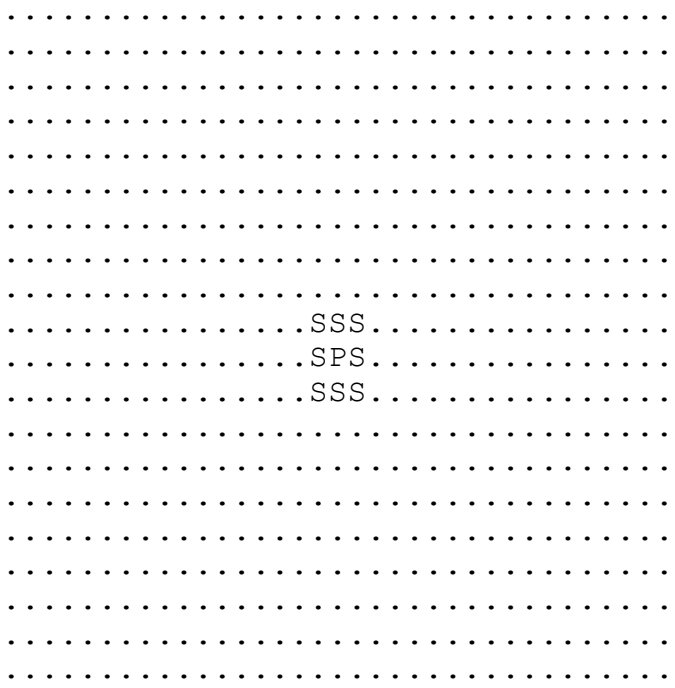
In the spring the seed germinates into a plant as shown in **Figure 3**.

Figure 3



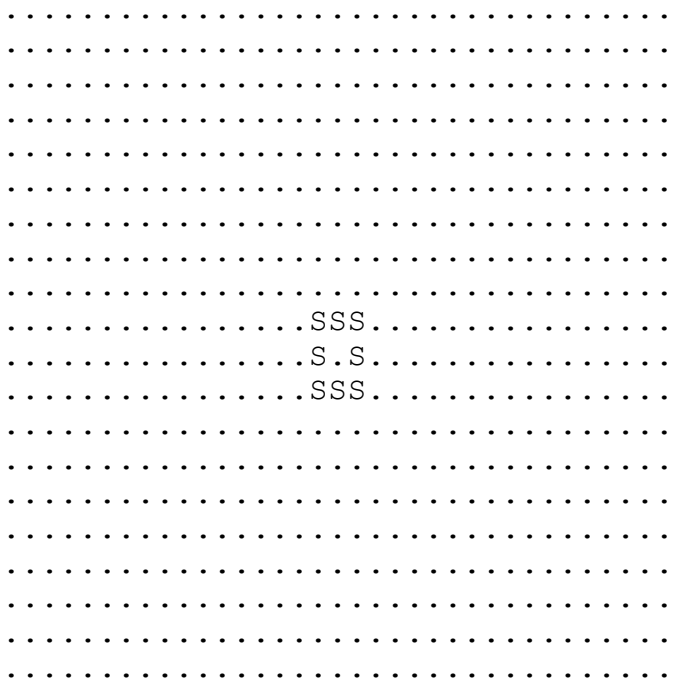
In the autumn the plant drops a seed in each cell immediately around the plant as shown in **Figure 4**.

Figure 4



In the winter the plant dies. This is represented by the cell content changing to a `'.'` as shown in **Figure 5**.

Figure 5

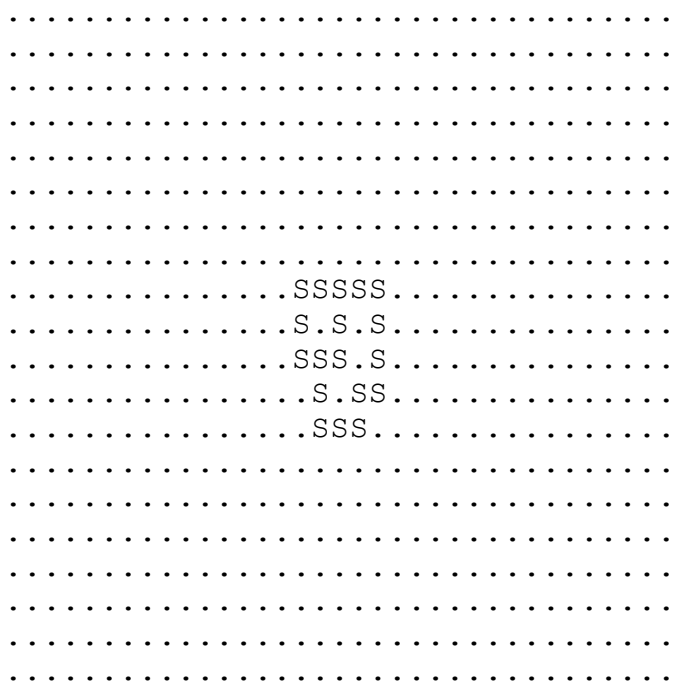


The seeds then lie dormant until spring when the cycle starts again and each seed germinates into a plant. In the spring a random frost may occur and kill off some of the plants. In the summer random rainfall patterns can result in a severe drought which also kills off some of the plants. In the autumn plants drop their seeds.

- If more than one seed lands in (drops into) a cell, only one seed survives.
- If there is a plant where a seed lands, the seed does not survive. The plant remains in the cell.
- If there is rock where a seed lands the seed does not survive. The rock remains in the cell.

At the end of year 2 the field contents may be as shown in **Figure 6**.

Figure 6



The **Skeleton Program** can use the **TestCase.txt Data File** to start the simulation with a different setup.

Figure 7 shows the contents of **TestCase.txt**.

Figure 7

```
......S.............................|  0
....................X.............|  1
....................................|  2
.........SSSSSSXSSSSSSSSSS...S.....|  3
....................................|  4
.........S.S...........S.S.........|  5
.........S.............S.........|  6
.........S.SSSSSSSSSSXSS.S.........|  7
.........S.S...........S.S.........|  8
..X.................................|  9
.........S.S.S.......S.S.S.........| 10
.........S.X.S.SSSSS.S.S.S.........| 11
.........S.S.S.S...S.S.S.S...X.....| 12
.........S.S.S.S.S.S.S.S.S.........| 13
.........S.S.S.S...S.S.S.S.........| 14
.........S.....SSSSS.....S.........| 15
.........S.S.S.......S.S.S.........| 16
..........XX........S..............| 17
.........S.S...........S.S.........| 18
.........S.............S.........| 19
```

The **Skeleton Program** allows the user to simulate plant growth and propagation for up to five years. There is also an option to step through the simulation a year at a time.

END OF PRELIMINARY MATERIAL

There is no Preliminary Material printed on this page