Grafting Peas and Beans

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Abstract:

Grafting- a common gardening technique that unites a scion (top of one plant) with a rootstock (the root of another plant). Often times people graft their plants in order to repair a broken or injured plant, to speed up the growth by giving it a well developed rootstock, or to create a variety of plants in a safe way. The researcher wanted to test the quality of grafting among pea plants and bean plants to see if they would produce more fruit of higher quality, or if any crossing of the individual genomes would occur. The researcher hypothesized that grafted plants would grow faster, produce more, and be of better quality than the originals. To begin, the researcher planted 6 bean plants and 6 pea plants. After the plants were well developed, the researcher took 3 of each plant and crossed the tops of the peas and the bottom of the beans. Over the next 30 days, all of the plants were monitored and measured in height. Overall, the grafted plants had wilted and died, while the original plants grew at a healthy rate. What the researcher has concluded is that grafting is a difficult skill to master, and many methods could be tweaked to have a more favorable outcome. If the researcher had chosen plants with stems of more similar diameter, the plants might have lived. In conclusion, it is still an important experiment as it shows how delicate the lives of plants truly are, and only masters can manipulate them safely.

Discussion

The data listed below can be interpreted as such. The grafted plants had all wilted within the second day, and by the 21st day, the second and third grafts had died completely. The peas did not produce any fruit, as predicted, and although the beans produced 2 bean pods throughout the duration of the experiment; the hypothesis suggested that the beans would produce about 4 times that much. Methods that could have improved the outcome of this experiment include: the

style of grafting, as there are hundreds, the types of species of peas and beans that were used, or a mixture of the two. Unfortunately, the type of pea used had a very thin stem, while the bean species used had a very thick stem, making them difficult to graft. The researcher had not known this at the time that the experiment began, and in hindsight this would have been something to be tweaked. As for the grafting method, there are many types, and some methods work better than others.

The information presented by this experiment can possibly be useful in later adaptations of this experiment. For example, we now know that not all stems are compatible, and grafting only works if stems are of equal thickness. Also, future science experiments involving grafting plants may use more effective methods of grafting. Grafting itself is a very helpful and important technique, and is very difficult to do properly, however when done correctly, the scientist can reap many benefits. There is a lot of opposition to altering and tweaking the genetics of plants by way of fertilizers in the name of producing larger and more varied crops, and this can potentially be replaced by grafting, which offers a safe and natural way for the plants to be altered, while also producing similar results (varied species, fruits, and healing wounded plants).

Overall, this experiment proved unsuccessful, and the data did not match up with the hypothesis that the researcher proposed. The hypothesis stated that the grafted plants would not only surpass the original plants in height, but also in fruit produced; in reality, the grafted plants not only produced no fruit, but they also died within a few days of the experiment. The researcher will be continuing her study on grafting by using grafting to potentially solve the drought crisis in California. If the researcher can successfully graft a wet-climate scion to a dry-climate rootstock and enable it to thrive in the dry environment that it would normally perish in, then places of drier climates would be able to grow wet-climate-native plants, and visa versa.

Data

Day	Average Height of Bean (cm.) / fruit produced	Average Height of Pea (cm.) / fruit produced	Average Height of Grafted plant (cm.) / fruit produced	Observations
1	21/0	6.5/0	20.5/0	all are healthy and well
2	21.1/0	6.5/0	19.3/0	the grafts are beginning to wilt
3	21.3/0	6.6/0	19.2/0	beans and peas are growing, grafts are shrinking
4	21.4/0	6.7/0	18.3/0	tops are completely dead on grafts
5	21.8/0	6.9/0	16/0	grafts are alive on the bottom, dead on top
6	22.5/0	7.2/0	16/0	beans are beginning to develop signs of pods
7	22.9/0	7.4/0	16/0	small growth in beans and peas
8	23.2/0	7.9/0	16/0	beans and peas are healthy
9	23.7/0	8.2/0	14/0	Third graft dies
10	23.9/0	8.4/0	14/0	pods are almost developing beans inside
11	24.1/0	8.5/0	14/0	no changes
12	24.2/1	8.7/0	14/0	bean pod is fully developed
13	24.3/1	8.8/0	14/0	second graft is almost dead

14	24.3/1	9/0	14/0	no growth
15	24.4/1	9/0	14/0	beans and peas are healthy and well
16	24.4/2	9.1/0	14/0	second bean is developing
17	24.5/2	9.1/0	14/0	the second bean is growing larger
18	24.6/2	9.3/0	14/0	peas are slowing down in growth
19	24.6/2	9.4/0	14/0	leaves on beans are very green

20	24.7/2	9.4/0	14/0	signs of third bean are developing
21	24.8/2	9.5/0	14/0	second graft is starting to die
22	24.8/2	9.5/0	10/0	second graft is dead
23	24.9/2	9.6/0	10/0	second bean is developing more
24	24.9/2	9.6/0	10/0	the peas and beans are slowing in growth rate
25	25.7/2	9.7/0	10/0	still no peas growing
26	25.7/2	9.8/0	10/0	no changes
27	25.7/2	9.9/0	10/0	no growth
28	25.8/2	10/0	10/0	all beans are beginning to grow more pods
29	25.9/2	10.1/0	10/0	the experiment is almost done

30	26/2	10.1/0	10/0	Grafted plants are all dead, beans and peas are both very healthy