A NOTE ON THE OPENING OF THE FLOWERS OF PORTULACA TUBEROSA

BY

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One morning in the month of December, 1930, it was noticed at 9 a m. that the flowers of the pots which were in direct sunlight, were more or less fully opened and the flowers of those pots which were in shade, were partially opened. This prompted me to perform the following experiments and to make the following observations in order to find out the condition under which the flowers open.

Experiment No. 1, December 7th, 1930.

(a) At 6.30 a.m. two pots, whose flowers were still in bud, were removed from outside and were placed in a corner of a room. A 60 W. electric bulb was lighted at a distance of 6 inches over two buds in one pot. The other pot was kept at a distance of 30-32 inches from the bulb. After an hour it was noticed that several buds besides the two in question had opened out. The temperature near those two flowers over which the bulb was burning was 29. 5°-30 C and the temperature at a distance of 9-11 inches was 28° C. At 4-30 p.m. that is. after 9 hours, it was noticed that those flowers which were at a distance of 9-11 inches began to close up and in half an hour's time they closed up completely. The temperature at 5 p.m. at a distance of 10 inches from the bulb was 26.5° C. But those flowers, which were just below the bulb remained open till 7-30 p.m. At 7-45 p.m., a closing up tendency in these two flowers was noticed and at 8-30 pm. the flowers closed up. The temperature at 8-30 p.m. near those two flowers was 29° C. The temperature of the room at the beginning of the experiment was 21 C. and that at 9 p.m. was 19 C.

(b) It was also noticed that the branches had bent towards the source of light. To make sure whether the bending of the branches was brought about by a change in temperature, the bulb was next wrapped up by a tin foil and then the whole thing was wrapped up by a thick black paper and it was made sure that no light was leaking out and the switch was put on. It was found that in half an hour s time the branches bent towards the bulb. When the light was put off, the branches within 3 minutes' time assumed their original position.

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(c) The buds of the second pot which was at a distance of 30-32 ins. away from the bulb, did not open at all. Next morning the same bulb was lighted just over two buds at a distance of 6 inches, and it was noticed that several buds besides the two in question opened out. But almost all of them closed up completely after 3 hours time : although under normal condition they remain open on these days (4th December, 20th December), for 6-7 hours. At the time when the flowers were closing up, the temperature near those two flowers over which the bulb was burning was 30° C.

Experiment No. 2, December 18th, 1930.

A flower pot was kept in the dark room in the evening Next morning just over two buds from a distance of 6 inches a 60 W. bulb was kept burning. Before the light was put on, a glass dish containing about $\frac{3}{4}$ of an inch of water was kept in between the bulb and the buds. There was a constant flow of water in the dish. This was done to cut off the heat rays. The buds were kept in this condition for over two hours, but they did not open. The dish was removed and after an hour the buds opened out fully.

Experiment No. 3, January 8th, 1931.

Some buds which were expected to open the next morning, were slipped in along with the branches into a light-proof bag in the night. It was found at 10 a.m. next morning that the buds within the bag had opened out completely.

Experiment No. 4, January 12th, 1931.

In the dark room, an experiment was set up in the same manner as in Exp. No. 1, but the bulb which was wrapped up by a tin foil was kept burning at a distance of 14" from two buds. It was found that the buds did not open even after two hours. The temperature near the two buds was 25° C. The bulb was gradually lowered down till a temperature of 27° C was reached near those two buds. It was noticed that at this temperature the flowers opened out. After two hours' time when the flowers were still open, the bulb was still lowered down and the temperature near those two flowers became 35° C and the flowers closed up completely in quarter of an hour. By regulating the distance of the bulb from the flowers, it was found out that the flowers remain open at any temperature between 27° C and 33° C. But when the temperature exceeds 33° C, there is always a tendency towards the closing of the flowers.

Experiment No. 5, April 14-17, 1931.

On these days the flowers remain open for 3-4 hours. They generally close up at about 11 a.m. when the temperature in the sun is about 35° C.

Conclusion.

(1) That the opening of the flowers in Portulaca tuberosa is brought about by a change of temperature, the change being from lower to higher and that at any temperature between 27-33 C. the flowers remain open.

(2) That the maximum period during which the flowers can be made to remain open artificially is about 12 hours, vide Exp. I (a), Under natural conditions in winter they remain open for about 6 hours and in summer for about 4 hours. In winter the closing up of the flowers in the evening is due to a fall in temperature, but the early closing up in summer is due to higher temperature.

(3) The buds which are not allowed to open at the due time, can be made to open by supplying the favourable condition but for a shorter duration vide Exp. I (c).

(4) The branches of this plant are also sensitive to temperature and they are positively thermotropic. Exp. I (b).

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