Plants perform precise arithmetic calculations to prevent starvation overnight, according to new research published in the open access journal *eLife*. Scientists working at the John Innes Centre (JIC) in Norfolk, England report that plants will make calculations that allow them to use up their reserves of starch so precisely that they are depleted at dawn, when a new round of photosynthesis begins.

Martin Howard, an expert mathematical modeler at the JIC, said the research is the "first concrete example in a fundamental biological process of such a sophisticated arithmetic calculation."

Alison Smith, a JIC metabolic biologist involved in the study, said plants' ability to accurately perform division is vital to botanical growth and productivity, adding that understanding how plants continue to grow in the dark could help unlock new ways to boost crop yield. The researchers report that the mechanisms inside the plants' leaves work in the night to measure the amounts of starch reserves and divide it against the time remaining until dawn, when daylight will allow them to photosynthesize more starch. If given a test for accuracy, the
plants would be near the top of their class - researchers report the plants calculate so effectively that 95 percent of the starch reserve is used up by dawn.

"The calculations are precise so that plants prevent starvation but also make the most efficient use of their food," Smith said in a statement. "If the starch store is used too fast, plants will starve and stop growing during the night. If the store is used too slowly, some of it will be wasted."