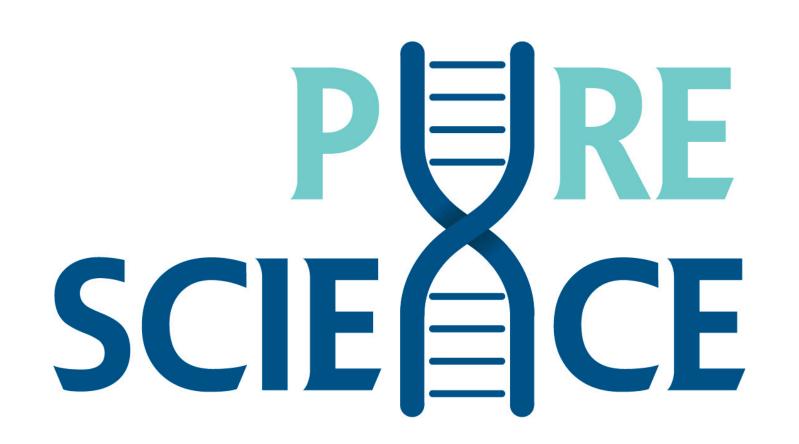


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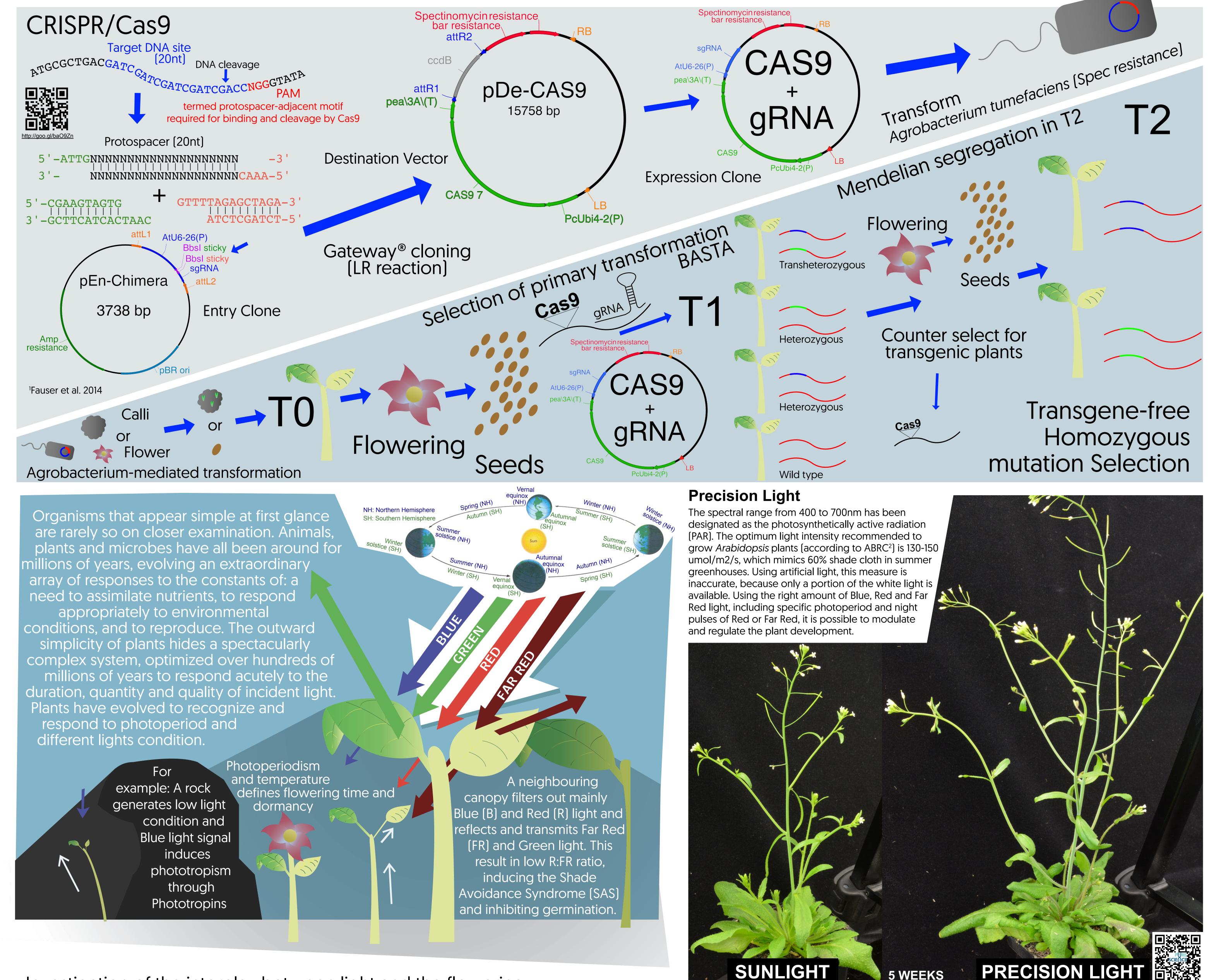


Acceleration of CRISPR/Cas9 breeding using flowering stimulation and precision lighting

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Abstract: As a renewable resource, the demand for wood products is expected to continue to increase into the future. Compared to annual crop plants, direct genetic modification of trees species has gained little attention, partially because trees have much longer lifecycles and tight regulations opposing transgenic use in the field. The newly developed gene editing technologies, such CRISPR/Cas9 increase the potential for the modification of species. CRISPR/Cas9 has several major advantages over previous transgenic-based approaches and can work alongside conventional breeding programs by directly improving known yield-related loci or genes. We have a modified CRISPR/Cas9 system that promotes early flowering in plants. Together with precision lighting with different ratios of Blue, Red and Far Red light we have managed to regulate the acceleration of flowering time to get viable flowers. The CRISPR/Cas9 mutated plants flower earlier than the wild type plants, resulting in fast recovery of the second generation (T2) in Arabidopsis. We will use this technology to accelerate breeding in arboreus species.



Investigation of the interplay between light and the flowering

response are being investigated by application of various light conditions. Once the light variables have been optimised they will be reinvestigated with Arabidopsis thaliana transformed with modified CRISPR/Cas9 targeting ABH1, SAC9 to resulting in bleached cotyledons or PDS3 resulting in albino plants, obtaining homozygous mutants faster than wild type.

Our current work aims to explore and optimise the variables within this system of CRISPR/Cas9 in conjunction with precision light for future exploitation to deliver positives outcomes for stakeholders in the forestry industry.