What is PCR and How is it Used in Plant Science??

You may have heard the term "PCR" through its widespread use in the medical field and reference in the media as a diagnostic test for human pathogens. You may be wondering "what is PCR? How does it work? Are there uses for PCR in my cultivation practices?" Here we discuss these topics to give a technical overview of PCR.

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What is PCR

PCR is an acronym for Polymerase Chain Reaction. It was developed in 1983 by Kary Mullis who was later awarded the 1993 Noble Price in Chemistry for that work. PCR is a technique used in molecular biology to amplify specific regions of genetic material that can be processed and analyzed with downstream applications such as sequencing or electrophoresis.

There are several types of PCR used including reverse transcriptase PCR (RT-PCR) where an RNA target is converted into DNA prior to amplification and quantitative PCR (qPCR) in which the general amount of input material (DNA, RNA) is measured during PCR (real time) or at the end of the process (end-point).

Science Brief

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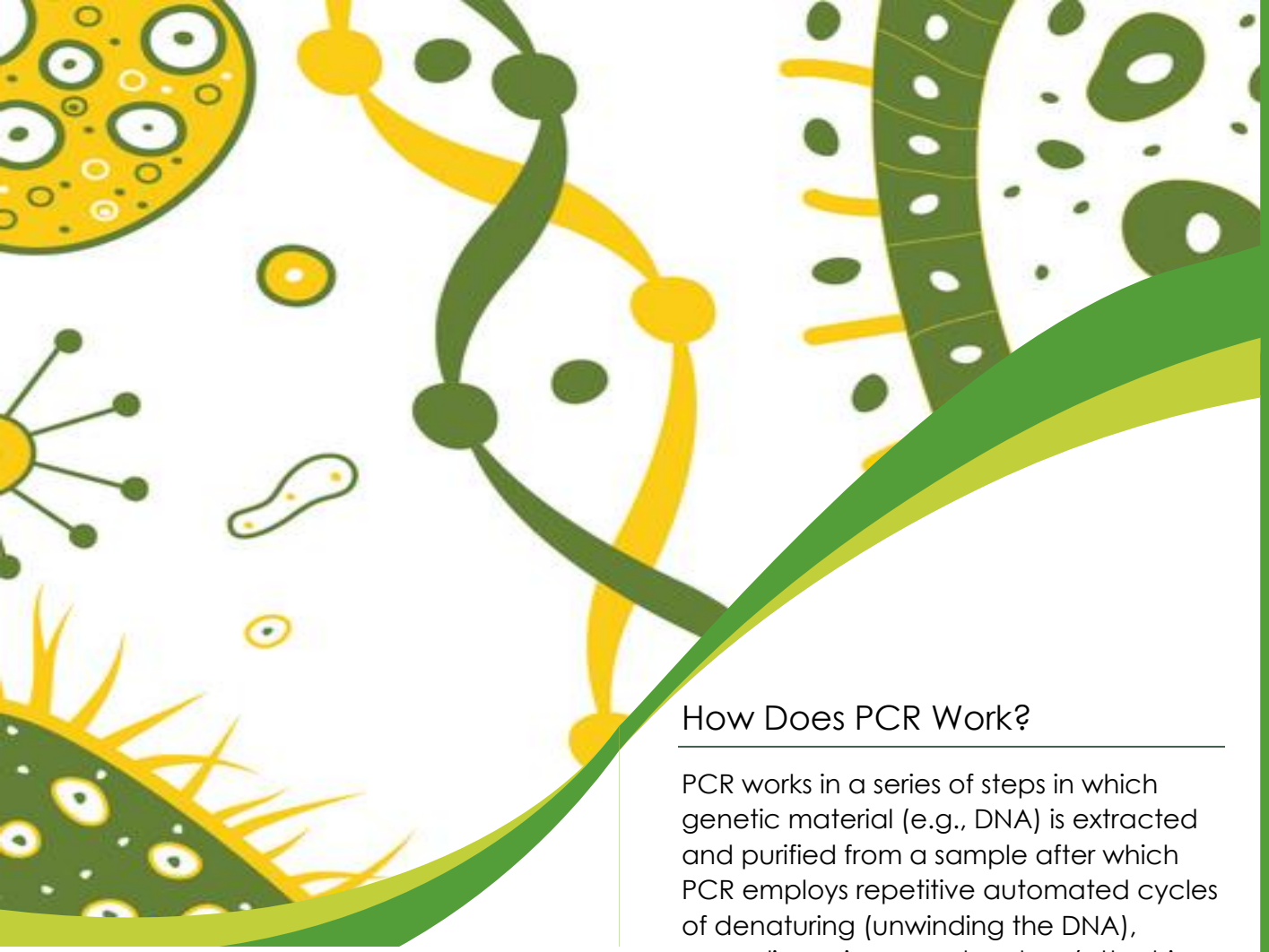
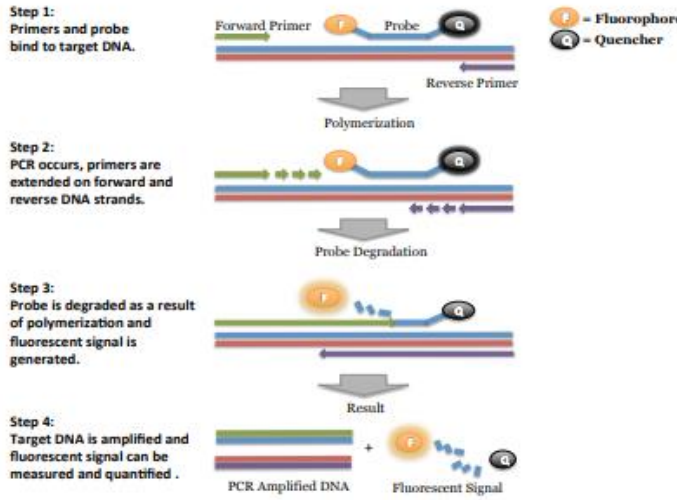
Week of May 1st, 2021





How Does PCR Work?

PCR works in a series of steps in which genetic material (e.g., DNA) is extracted and purified from a sample after which PCR employs repetitive automated cycles of denaturing (unwinding the DNA), annealing primers and probes (attaching complimentary DNA segments to the targeted section) and amplification (making many copies of the targeted DNA using polymerase enzyme). In qPCR, probes release fluorophores after each round of replication and the qPCR device reads the fluorescent signal generated to quantify the genetic products in real time.

See the figure on left.

Are There Uses for PCR in Plant Production?

As you might have suspected, there are numerous applications for PCR in plant production. PCR allows for highly sensitive and selective detection of specific pathogens such as Fusarium, or Aspergillus which can aid in troubleshooting and process optimization. PCR can also be used to detect the cannabis Y-chromosome and in doing so identify male plants very early in their development. Emerging PCR assays can even provide insight on the relative THC: CBD production potential in cannabis plants. New assays are continually being developed which will only expand the use of this powerful tool.

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