

HOW DOES ISOPRENE PROTECT PLANT MEMEBRANES FROM THERMAL SHOCK?

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Isoprene (2-methyl-1,3-butadiene) is one of the most common volatile hydrocarbons emitted by plants. The very large quantities of isoprene released (10^{14} kg/year) can aggravate air pollution and indirectly effects global warming. During short, acute increases in temperature the production and emission of isoprene increases dramatically. One hypothesis is that this small hydrocarbon can stabilize lamellar membrane structures enhancing the tolerance to the thylakoid membranes to heat. Using molecular dynamics techniques we have studied the effect of isoprene concentration on the properties of a model DMPC (dimirystoylphosphatidylcholine) as a function of temperature between 303K-353K. We show that isoprene spontaneously migrates to the middle of the bilayer. At a given temperature addition of isoprene lowers the effective order parameter thus mitigating the effects of increased temperature on the fluidity of the membrane.

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