P012 GC preference of plant Dicer-like in antiviral siRNA production

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RNA silencing is a defense mechanism in which virus-infected plants produce short interfering RNAs (siRNAs) derived from viral source to attack the virus at post-transcriptional level. In Brassica juncea (a dicot), siRNAs against Turnip crinkle carmovirus (Tombusviridae) were produced predominantly (97.6%) in viral sense suggesting that majority of siRNAs are products of direct cleavage of the virus single strand RNA by plant Dicer-like (DCL) enzymes. However, siRNAs against Turnip mosaic potyvirus were derived from both strands (+ / - = 58.1 / 41.9%), indicating the presence of alternative siRNA production mechanisms. There was operational similarity between different DCLs as TuMV siRNAs were dominated by 21 and 22-nt long species originated mainly from the same siRNA hotspots. A substrate preference on G&C (GC) rich regions was observed as an ancient feature for plant DCLs of both dicot and monocot as (1) robust GC bias was observed for TuMV siRNAs versus the virus genome, and (2) siRNAs against Cocksfoot streak potyvirus cloned from wild Dactylis glomerata (a monocot) also displayed strong GC preference. Plant miRNAs also display a GC bias when compared to their precursor sequences whereas animal miRNAs appear to lack this feature.