The Tel and PLMVd RNAs have been combined to simplify the identification of PLMVd in hosts, and how we could prevent infection or pathogenesis. The ultimate questions asked are “How does the 3D structure of the viroid affect its infectivity and pathogenesis?” and “How does the RNA recruit proteins within the plant to establish the infection?” We utilized gel electrophoresis, fast protein liquid chromatography (FPLC), and electron microscopy. To prepare samples for electron microscopy we attempted to flash freeze samples harvested from the FPLC to see if their structure would resemble that of the unfrozen samples. Tel-PLMVd fusion RNA. The Tel and PLMVd RNAs have been combined to simplify the identification of PLMVd in imaging. In addition to electron microscopy we conducted an experiment in which we increased the amount of spermine in the Tel-PLMVd transcription to determine if it would inhibit the hammerhead ribozyme from self cleaving.

**Inhibition of Hammerhead Ribozyme**

A previous study showed that spermine could inhibit the self-cleaving of a different viroid [3]. To the left is the resulting gel when we tested different quantities of spermine and spermidine (0 or either, 10, 20, 50, 100, 392 spermine, and 2 mM spermidine.) We are able to see Tel PLMVd RNA (top band) as well as self cleavage products (bottom band).

**Conclusion & Future Studies**

In conclusion we were able to determine that freezing the Tel-PLMVd RNP prior to electron microscopy will alter the visualization of the samples. Thus making it a not viable option for cryo-electron microscopy grid preparation. In addition we were able to see that the addition of spermine will not inhibit the self cleaving of hammerhead ribozyme within Tel-PLMVd.

The pursuit of the 3D structure will continue with the use of electron microscopy. In addition they will be testing the tertiary contacts in order to see the effects they have on the overall folding of the viroid. Finally they will determine the associated proteins necessary for the viroid to infect plants using a plant bioassay.

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**Literature Cited**