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Co-regulation of the Glycine max soluble N-ethylmaleimide-sensitive fusion protein attachment protein receptor (SNARE)-containing regulation occurs during defense to a root pathogen

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Heterodera glycines, also known as Soybean Cyst Nematode (SCN) is a major pathogen of soybean (Glycine max), causes nearly a billion-dollar loss in U.S. every year (Wrather et al. 2001; Wrather and Koenning, 2006; Smolik and Draper, 2007; Koenning and Wrather, 2010). Efforts to combat SCN include production of resistant soybean varieties, use of nematicides, improved crop rotation and bio-control methods (Wrather et al. 1984; Chang et al. 2011). However, effective control has not been achieved yet. Study of host plant interactions at the cellular level is important as it may provide new species-specific means of controlling SCN (Klink et al. 2007). We are conducting various molecular approaches to find actual cellular mechanism of host resistance. Closer study of infected cells in resistant variety G. max [Peking/PI548402] and susceptible variety G. max [Williams 82(PI518671)] through laser microdissection have resulted various unique genes present in G. max [Peking/PI548402] (Klink et al. 2007; 2009). Overexpression of these genes in susceptible cultivar G. max [Williams 82(PI518671)] have resulted resistance by inducing incompatible reaction and RNA interference of these genes in resistant genotypes resulted susceptible reaction, thereby inducing compatible

reaction (Matsye et al. 2012; Pant et al. 2014). In this approach we have overexpressed the components of the Soluble N-ethylmaleimide-sensitive fusion (NSF) Attachment Protein (SNAP) REceptor (SNARE) complex that helps in docking of the vesicles to the membrane and subsequent release of the vesicular contents to the apoplast (Jahn and Fasshauer et al. 2012; Matsye et al. 2012; Pant et al. 2014). There are many proteins that play significant role in this process however, the core components of this study are syntaxin 121 (SYP121), Synaptosomal-associated protein 25 (SNAP-25), Synaptotagmin (SYT), Synaptobrevin (SYB), Secretion 1/mammalian uncoordinated-18 ([Sec1]/Munc18) and N-ethylmaleimide-sensitive fusion protein (NSF). Syntaxin 121, G. max homolog of Saccharomyces cerevisiae, Suppressor of sec1 (SSO1) known as PENETRATION1 (PEN1) in Arabidopsis thaliana, (Collins et al. 2003) function in resistance to Heterodera glycine. Co-expression of SYP121 with SNARE homologs results elevated transcripts in infected cells inducing resistance reaction.

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