**Supplemental Material S1: Background information**

Legumes (*Fabaceae*) are one of the most speciose plant families (Ricklefs and Renner 1994) and are one of the few organisms capable of fixing atmospheric nitrogen through their symbiosis with rhizobia. As such, they provide ecosystem services to virtually all terrestrial plant communities (Mulder et al. 2004, Hooper et al. 2005) and are vital to contemporary and historical agricultural systems (Harlan 1966). The legume host provides photosynthate for energy and in return the bacterium reduces unreactive atmospheric nitrogen to the biologically available form ammonia. Nitrogen fixation occurs in novel, plant derived organs called root nodules. Nodule formation is a complex process relying on coordinated chemical signaling between the plant root and rhizobia in the soil.

As a result of the signaling process, legume species vary widely in the specificity of the symbiosis, with some legumes able to partner with a broad range of distinct rhizobial groups, and other legumes able to form nodules with one or a few rhizobia lineages (Oldroyd and Downie, 2008). For example, legumes of the genus *Medicago* typically associate with rhizobia in the *Sinorhizobium* clade, though specificity varies within and among species (Bena et al. 2005). Similarly, nitrogen fixation in the legume crop chickpea is highly specific as there are two primary described species of rhizobia that have been isolated from chickpea nodules: *Mesorhizobium ciceri* and *Mesorhizobium mediterraneum* (Kantar *et al.*, p. 185 in Yadav, *et al.*, 2006); in North Africa, chickpea can also be nodulated by *Sinorhizobium medicae* (Aouani *et al.,* 2001), but the symbiosis is ineffective. As in most legume-rhizobium interactions, symbiotic nitrogen fixation in chickpea depends on both plant genotype and bacterial strain (Somasegaren *et al.* 1988). Understanding and maximizing the potential of biological nitrogen fixation in a crop like chickpea will thus require equal understanding of the plant and its symbiont, including how symbiont geographic range and population structure tracks that of its host.

Some legumes form nodules with a restricted subset of symbionts through selective perception of specific bacterial ligands (Nod factors), the initiation of defense reactions in response to bacterial Type III ligands, or via as yet unknown mechanisms (e.g. Geurts et al. 1997, Tirichine et al. 2000, Lorio et al. 2006). Many studies demonstrate strong interactions between legume genotype and symbiont strain in determining levels of nodulation and plant performance (Mutch and Young 2004, Mhadhbi et al. 2005); host-symbiont coevolution thus likely plays a role in adaptive differentiation of both legume species and rhizobial species, contributing to their diversity.

Furthermore, stresses in soils such as drought, excessively high levels of certain molecules (saline soils, heavy metals, etc) or pathogens and herbivores may affect the legume-rhizobial symbiosis in still poorly understood ways. For example, legumes exhibit varying levels of response to abiotic stress in biological nitrogen fixation traits. Nitrogen fixation is a highly energy-demanding process, so stresses that affect plant growth and photosynthetic rates also inhibit nodule formation and nodule function. Environmental stresses such as drought, heat, and salinity have also been shown to reduce rhizobial population size and retention time in soil. However, large variation exists in the magnitude of the effects that abiotic stress has on nitrogen fixation between legume species, between rhizobial isolates, as well as within populations of legumes (Zahran, 1999). The study of the effect of abiotic stress on nitrogen fixation on the vast majority of legumes, including important crops, has been limited. Drought stress has been shown to reduce nodule formation, as well as nitrogen fixation rates when measured directly, but the effect depends on the strain used to inoculate (Esfahani & Mostajeran, 2011). As an example, temperatures above 30 C have been shown to reduce nodule number as well as growth of chickpea symbionts in culture (Rodrigues *et al.*, 2006), but few experiments have been done to examine the effects of temperature on nitrogen fixation in chickpea, and all work has been conducted on cultivated germplasm of limited genetic diversity (Devasirvatham, 2012). Furthermore, both drought and salinity effects on nitrogen fixation vary by chickpea genotype as well as rhizobial inoculant, underscoring the substantial potential benefits of research focused on maximizing resilience of nitrogen fixation to abiotic stress in legumes (Toker *et al.*, p. 486-488 in Yadav *et al.*, 2006; Mhadhbi *et al.*, 2008).

**Legume List.** This list contains a number of common legume crop species for which seeds are commercially available, as well as a number of native and introduced legume species which can be relatively easily found in natural areas of disturbed areas. We have included a number of minor legume crops that are of cultural significance to many immigrant and refugee populations as well, such as grasspea and mung bean.

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| **Common Name** | **Scientific Name** | **Crop or Native** |
| Common pea | *Pisum sativum* | crop |
| Common bean | *Phaseolus vulgaris* | crop |
| Soybean | *Glycine max* | crop |
| Black-eyed peas | *Vigna ungulata* | crop |
| Adzuki bean | *Vigna angularis* | crop |
| Chickpea | *Cicer arietinum* | crop |
| Lentil | *Lens culinaris* | crop |
| Pigeonpea | *Cajanus cajan* | crop |
| Peanut | *Arachis hypogea* | crop |
| Alfalfa | *Medicago sativa* | forage crop |
| White clover | *Trifolium repens* | forage crop |
| Sweet clover | *Melilotus officinalis* | forage crop |
| Lima bean | *Phaseouls lunatus* | crop |
| Mung bean | *Vigna radiata* | crop |
| Grasspea, chickling vetch | *Lathyrus sativus* | crop |
| black medic | *Medicago lupulina* | exotic, widespread |
| burclover | *Medicago polymorpha* | exotic, widespread |
| Partridge pea | *Chamaecrista fasiculata* | native, widespread |
| Blue wild indigo | *Baptisia australis* | native, widespread |
| Wild senna | *Senna hebecarpa* | native, widespread |
| Illinois bundleflower | *Desmanthus illinoensis* | native, widespread |
| Hog peanut | *Amphicarpaea bracteata* | native, widespread |
| Round headed bush clover | *Lespedeza capitata* | native, widespread |
| Pale pea | *Lathyrus ochroleucus* | native, widespread |
| Veiny pea / Wild pea | *Lathyrus venosus* | native, widespread |
| Beach pea | *Lathyrus maritimus* | native, widespread |
| False indigo | *Amorpha fruticosa* | native, widespread |
| Leadplant | *Amorpha canescens* | native, widespread |
| Purple prairie clover | *Dalea purpureum* | native, widespread |
| White prairie clover | *Dalea candidum* | native, widespread |
| Silky prairie clover | *Dalea villosum* | native, widespread |
| Wild licorice | *Glycyrrhiza lepidota* | native, widespread |
| Canada milkvetch | *Astralagus canadensis* | native, widespread |
| Ground plum | *Astralagus crassicarpus* | native, widespread |
| Small wild bean | *Strophostyles leiosperma* | native, widespread |
| Showy tick trefoil | *Desmodium canadense* | native, widespread |
| Wild lupine | *Lupinus perennis* | native, widespread |
| Scurfy pea | *Psoralea tenuiflora* | native, widespread |
| Breadroot | *Psoralea esculenta* | native, widespread |
| Prairie indigo | *Baptisia bracteata* | native, widespread |
| Dwarf false indigo | *Amorpha nana* | native, widespread |
| Maryland senna | *Senna marylandica* | native, widespread |
| American vetch | *Vicia americana* | native, widespread |
| Ascending purple milkvetch | *Astralagus striatus* | native, widespread |