Results

*Biotype, Plant, and Virus effects on aphid performance*

Aphid counts on each host plant after one week were significantly different among host-plant species following patterns expected from prior research on pea aphid performance. The effect of host-plant species was highly significant (Table S1, P < 0.001, 𝛘2 = 23.75, DF = 5), with aphid performance being relatively lower on Red Clover and relatively higher on hosts like Faba and Lentil (Fig 1). Virus status of host plant also significantly impacted aphid performance, but we observed non-additive affects based on host-plant species (Tables S1, Plant:Virus interaction, P < 0.001, 𝛘2 = 32.16, DF = 9). For example, aphid performed better on alfalfa plants exposed to BLRV compared to a sham (Fig. 2, Tukey HSD). Conversely, aphids performed significantly poorer on Hairy vetch exposed to BLRV compared to PEMV and sham plants (Fig. 2, Tukey HSD). The remaining host-plant species did not have significant differences in aphid performances across virus exposure status (Fig. 2, Tukey HSD).

There was a significant different in aphid biotype performance depending on host-plant species identity (Table S1, Biotype:Plant interaction, P < 0.001, 𝛘2 = 57.31, DF = 5). As predicted, the aphid genotype grouping Alfalfa performed significantly better on alfalfa compared to Pea (Fig 1, Tukey HSD). Conversely, the aphid genotype grouping Pea performed better on Hairy vetch and Pea compared to the Alfalfa genotype grouping (Fig 1, Tukey HSD). We observed no differences in aphid performance among the remaining host plants, Red Clover, Fava, and Lentil (Fig 1. Tukey HSD). Given analysis of deviance tables were calculated using Type II Wald-𝛘2 tests (Fox and Weisberg, 2018), results suggests the Biotype:Plant interaction term statistically accounts for the effect of biotype on aphid performance (Table S1, P = 0.5, 𝛘2 = 0.45, DF = 1).

*Biotype, Plant, and Virus effects on aphid preference*

Aphid preference for host plants was determined using total counts of aphids moving towards a respective host plant in a behavioral assay. Aphid preference different significantly among target hosts (Table S2, P < 0.001, 𝛘2 = 111.77, DF =5), and this preference varied according to aphid biotype (Tables S2, P < 0.001, 𝛘2 = 51.78, DF =5). Matching results from aphid performance, the Alfalfa genotype group were more attracted to alfalfa hosts compared to the Pea genotype grouping (Fig 3, Tukey HSD). Likewise, the Pea genotype grouping preferred Hairy vetch and Red clover (Fig 3, Tukey HSD). Paradoxically, we did not see a difference in preference for Pea plants among these genotype groupings (Fig 3, Tukey HSD).

All terms including virus exposure status were dropped from final model using our stepwise AIC approach. Consequently, there was no statistical evidence for the virus exposure status of these target host plants altering aphid preference (Table S2), nor did we observe any evidence that virus status influenced the effects of biotype or plant species identity (Table S2).

*Preference by performance relationship*

Upon completion of the prior two analyses, we examined the relationship between the number of aphids moving towards host plants (metric of preference) and the total number of aphids found on host plants after one week (metric of performance). With these metrics, we observed a positive relationship between aphid preference and aphid performance (Table S3, P < 0.001, 𝛘2 = 21.71, DF =1). As such, aphid movement to host plants for a given trial was higher under similar conditions by which aphid performance was higher (Fig 4). However, we did not observe any evidence that this relationship was modified for plants exposed to BLRV or PEMV (Table S3, Log Aphid Count:Virus interaction, P = 0.57, 𝛘2 = 1.13, DF =2). Across all infection statuses, aphid preference increased in trials where aphid performance was higher (Fig 4).