

Effect of *Lygus lineolaris* on different growth stages of navy beans (*Phaseolus vulgaris* L.)

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Introduction

Lygus bugs are significant pests of many crops in Manitoba. Adults and nymphs injure plant tissue by piercing and sucking the plant sap. Feeding by *L. lineolaris* may reduce yield quality and quantity of edible beans, and the effect is likely to vary according to plant growth stage. During the last decade edible bean growers have been concerned about the occurrence of plant bugs including *Lygus* bugs in their crop. In some years spraying for plant bugs on edible beans has occurred. Our field surveys showed that about 90% of the plant bugs in edible beans are *Lygus lineolaris*.

Objectives

This study characterizes the feeding injury and quantifies the damage caused by *L. lineolaris* on three growth stages of navy beans.

Methods

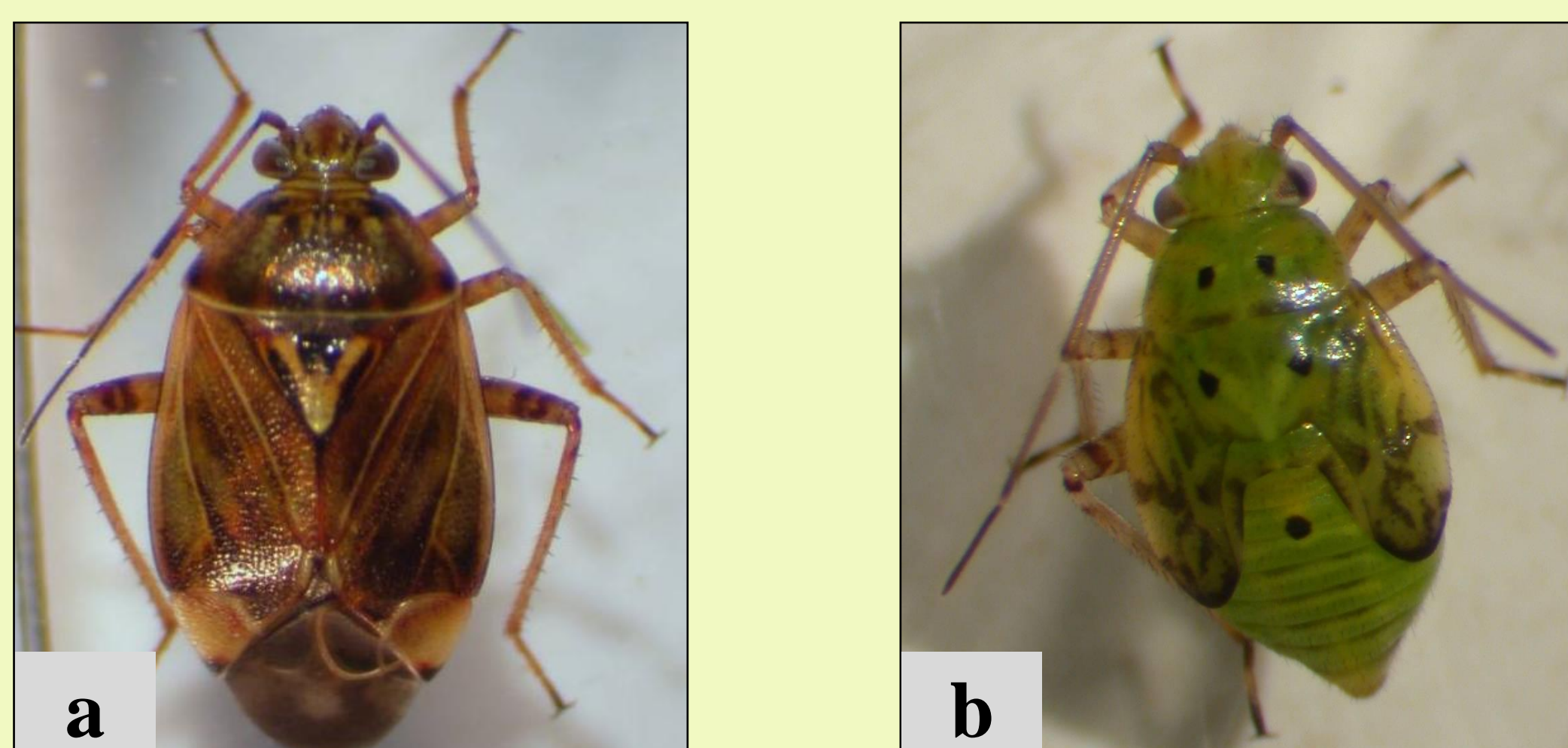


Figure 1: (a) Adult *Lygus lineolaris* and (b) 5th instar nymph reared in a laboratory colony at 21° C, 60% RH and 16:8 (L:D) photoperiod.

- Adults and 5th instar nymphs were confined to a single reproductive structure of a navy bean plant at either R2 (mid to full flowering), R4-R5 (mid pod to early seed fill) or R6-R7 (mid seed fill to seed maturity) growth stage (Fig. 2). There were six replicates of each treatment.
- The treatments were control, 5th instar nymphs and adults; 1 insect was caged at the R2 stage, 3 insects at R4-R5 and 5 insects at R6-R7.
- After 5 days of feeding, the insects were removed. The short term effect of injury was characterized by detaching the reproductive structure and examining it with light microscopy. The long term effect on yield was determined at harvest.



Figure 2: Experimental plants in controlled chamber at 24° C, 60% RH and 16:8 (L:D) photoperiod.

Results

- Type of injury differed with different growth stages (Fig. 3 a-c). The major injuries at R2 were pod abortion, pin head spots on pods, splitting of pods and breakage of flower stem. At R4-R5, injury to the placental and funiculus areas was the major effect and some seed pitting was observed. At R6-R7 seed pitting was the major injury.
- Seed weight losses due to insect treatments were significant in the R2 and R4-R5 stages but not in the R6-R7 stage. Where losses were significant, nymphs were more damaging than adults (Fig. 4 a-e)
- Yield quality loss due to seed pitting was significant in the R6-R7 stage (Fig. 4f)

Discussion

The effect by *L. lineolaris* varies with the growth stage fed upon. At R2, feeding by 5th instar nymphs produced significantly higher numbers of abortions than feeding by adults. In the field, adults are the most abundant stage during R2, and in our study did not significantly reduce yield at this stage. Later stage nymphs are dominant in the field at the R4-R5 stage, and loss due to seed shriveling could occur. In Manitoba, adults and later stages nymphs migrate from adjacent harvested canola at the R6-R7 stage of beans, resulting in high numbers in the bean crop. Quality loss due to seed pitting in R6-R7 stage could occur. Therefore how growth stage relates to the seasonal pattern of occurrence of *L. lineolaris* in commercially crops must be considered in the management of this pest.

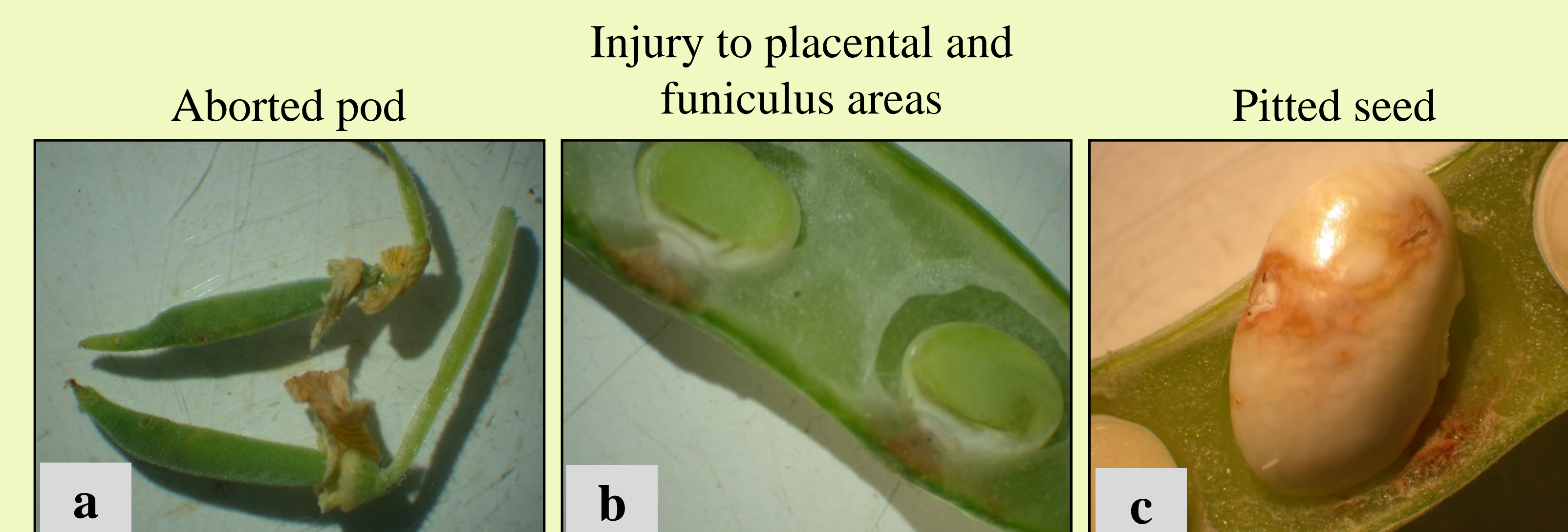


Figure 3: Injury by *Lygus lineolaris* feeding (a) at R2, (b) at R4-R5 and (c) R6-R7 stages of navy beans.

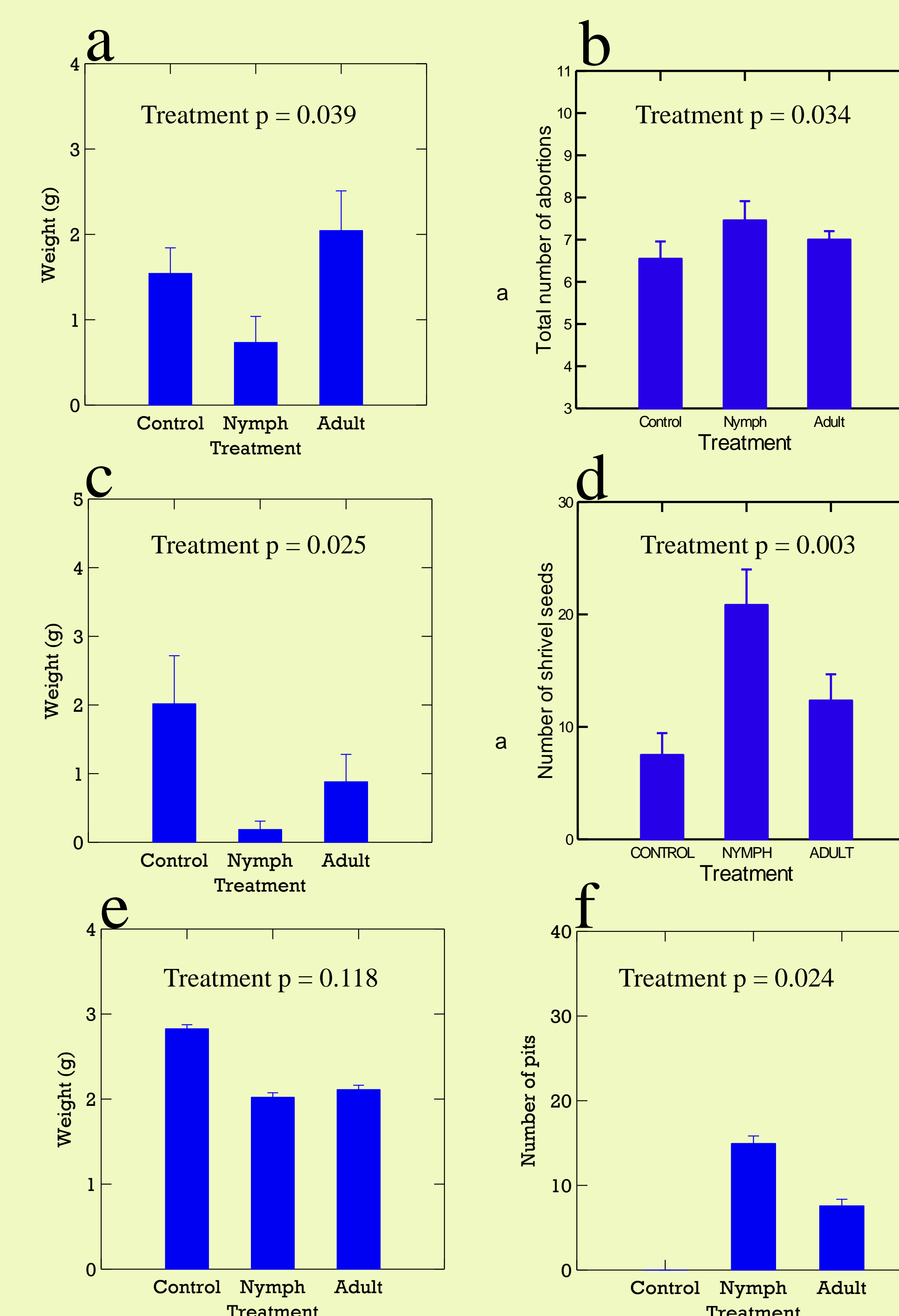


Figure 4: (a) Marketable seed weight and (b) pod abortions after feeding at R2; (c) marketable seed weight and (d) number of shriveled seeds after feeding at R4-R5 stage; (e) marketable seed weight and (f) number of pitted seeds after feeding at R6-R7.

Acknowledgements

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