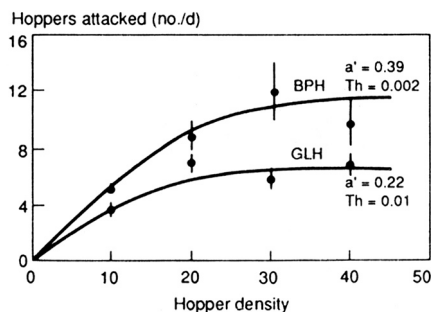


adult females exposed to adult hoppers in the greenhouse experiments. The *L. pseudoannulata* used were captured from ricefields. Spiders of similar size were selected and starved for 3 d. They were released in 19-cm-diam, 54-cm-high mylar cages at 10 hopper densities, with 10 replications.

Responses were fitted to Holling's type II curve (see figure). Since *L. pseudoannulata* is a sit-and-wait hunter that does not actively seek out prey, one would not expect it to show a type III functional response.

L. pseudoannulata spiders searched more efficiently for BPH than for GLH. They also had lower handling



Functional response of *Lycosa pseudoannulata* on BPH and GLH. IRRRI, 1989.

time, resulting in a higher plateau of prey attacked. This implies that BPH is the preferred prey. □

Insects feeding on rice grain in Bhutan

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Insects feeding on developing grain are common in southern Bhutan. We measured the density of this group of pests in 13 fields in 9 areas Oct-Nov 1988. Insect samples were taken from crops between flowering and the hard dough stage.

Each field was sampled five times, using 10 net sweeps while walking across the field/sample. Insects were preserved in 70% alcohol and brought to the laboratory.

Species collected included

<i>Leptocorisa</i> spp.,	40%
<i>Paromius</i> sp.,	26%
<i>Menida</i> sp.,	24%
<i>Nezara</i> sp.,	2%
<i>Cletus</i> sp.,	3%
Others,	6%

Very high densities were found in some areas with visible grain damage (see table). □

Numbers of grain feeders collected from different areas of southern Bhutan, Oct-Nov 1988.

Location	Variety planted	Growth stage	Grain feeders ^a (no./10 sweeps ± SE)
New area Bhur	Modern	Soft dough	14.8 ± 3.2
	Traditional	Soft dough	29.0 ± 1.8
Lalai	Traditional	Soft dough	5.2 ± 1.0
	Traditional	Soft dough	3.0 ± 1.1
	Traditional	Soft dough	1.3 ± 0.2
Taklai	Traditional	Soft dough	8.2 ± 2.6
Surey	Traditional	Hard dough	1.3 ± 0.6
	Traditional	Hard dough	59.4 ± 18.2
Lodrai	Modern	Hard dough	56.4 ± 18.0
Bhur Farm	Modern	Flowering	25.2 ± 3.0
Leopani	Traditional	Flowering	8.4 ± 2.5
Patabari	Traditional	Soft dough	3.4 ± 0.5
Hiley	Traditional	Hard dough	6.0 ± 2.9

^aAv of 5 replications/location. *Leptocorisa*, 40% (*L. acuta* = 70% and *L. oratorius* = 30%); *Nezara*, 2%; *Cletus*, 3%; *Menida*, 24%; *Paromius*, 25%; others, 6%.

Predatory coccinellids in ricefields at Agricultural College and Research Institute, Madurai

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We surveyed the experimental farm for predatory coccinellids in rice and in cowpea, black gram, and soybean. Eight species of predatory coccinellids were found feeding on brown planthoppers, whitebacked planthoppers, and leafhoppers in rice and aphids *Aphis craccivora* in pulses.

<i>Menochilus sexmaculatus</i> (Fabricius)	4.3%
<i>Rodolia concolor</i> (Lewis)	8%
<i>R. pumila</i> (Weise)	8%
<i>R. cardinalis</i> (Lewis)	8%
<i>Scymnus</i> sp. (Kamiya)	10%
<i>Micraspis discolor</i> (Fabricius)	5%
<i>Hormonia octomaculata</i> (Fabricius)	9%
<i>Sticholotis punctata</i> (Crotch)	25%
<i>S. substriata</i> (Crotch)	25% □

Vertical distribution of two hopper species on rice plants

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The rice canopy is the habitat of several species of hemiptera: *Nilaparvata lugens*, *Nephotettix virescens*, *Sogatella furcifera*, *Cyrtorhinus lividipennis*, and *Nisia atrovonosa*. The predominant species, brown planthopper (BPH) *N. lugens* and green leafhopper (GLH) *N. virescens*, are usually found at the base of the rice canopy. This raises questions about interspecific competition.

We introduced varying densities of 1-d-old female BPH and GLH adults separately and in combination on 35-d-old TN1 potted rice plants and recorded vertical distributions (see figure). At low densities, more than 80% BPH remained at the base of the plant close to the water surface. At

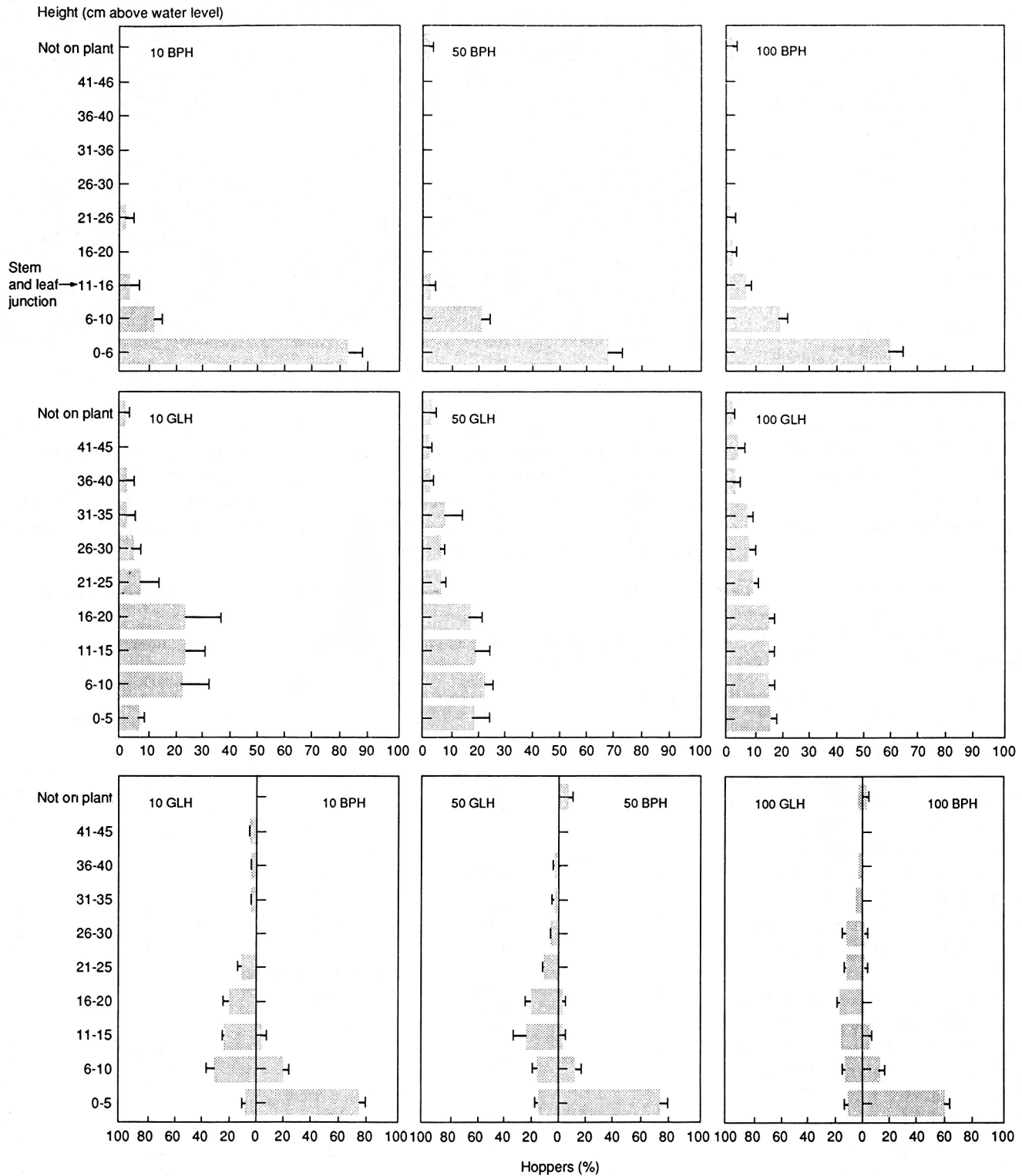
higher densities, BPH was found higher up, but most remained at the plant base.

At low densities, most GLH were found 6-20 cm above the water surface. At higher densities, GLH were more

evenly distributed.

Vertical distributions were similar with BPH and GLH combined. BPH remained at the base of rice plants, 5 cm above the water; GLH were more dispersed.

This implies that at low densities, interspecific competition is unlikely. Even at higher densities, direct competition would be slight because of distribution. □



Vertical distribution of BPH and GLH on rice plants. IRRI, 1989.