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Título: The ‘truck-driver’ effect in leaf-cutting ants: how individual load influences the walking speed of nest-mates

Autor/es: FARJI-BRENER, ALEJANDRO GUSTAVO; CHINCHILLA, FEDERICO; RIFKIN, SETH; SANCHEZ, ANA; TRIANA, EMILIMA; QUIROGA, VERÓNICA; GIRALDO, PAOLA

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Resumen: The foraging behaviour of social insects is highly flexible because it depends on the interplay between individual and collective decisions. In ants that use foraging trails, high ant flow may entail traffic problems if different workers vary widely in their walking speed. Slow ants carrying extra-large loads in the leaf-cutting ant *Atta cephalotes* L. (Hymenoptera: Formicidae) are characterized as ‘highly-laden’ ants, and their effect on delaying other laden ants is analyzed. Highly-laden ants carry loads that are 100% larger and show a 50% greater load-carrying capacity (i.e. load size/body size) than ‘ordinary-laden’ ants. Field manipulations reveal that these slow ants carrying extra-large loads can reduce the walking speed of the laden ants behind them by up to 50%. Moreover, the percentage of highly-laden ants decreases at high ant flow. Because the delaying effect of highly-laden ants on nest-mates is enhanced at high traffic levels, these results suggest that load size might be adjusted to reduce the negative effect on the rate of foraging input to the colony. Several causes have been proposed to explain why leaf-cutting ants cut and carry leaf fragments of sizes below their individual capacities. The avoidance of delay in laden nest-mates is suggested as another novel factor related to traffic flow that also might affect load size selection. The results of the present study illustrate how leaf-cutting ants are able to reduce their individual carrying performance to maximize the overall colony performance.



El diseño de senderos de forrajeo en nidos de hormigas cortadoras de hojas es similar al diseño de caminos en las sociedades humanas, bifurcaciones en un camino de paseo suburbano. (Foto: Agencia CyTA-Instituto Leloir)

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revisión de sus efectos sobre la vegetación
Ecología Austral; Año: 1992 vol. 2 p. 87 - 94

[+]

FARJI-BRENER, ALEJANDRO GUSTAVO; PROTOMASTRO, J; ALEJANDRO GUSTAVO FARJI BRENER

Patrones forrajeros de dos especies simpátricas de hormigas cortadoras de hojas (*Attini*, *Acromyrmex*) en el Chaco seco

Ecotropicos; Año: 1992 vol. 5 p. 32 - 43

[+]

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Forrajeo del Colibrí *Selasphorus flammula* en relación con tamaños y distribución de parches florales

Revista de Biología Tropical; Año: 1991 vol. 39 p. 169 - 172

[+]

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The 'truck-driver' effect in leaf-cutting ants: how individual load influences the walking speed of nest-mates

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The foraging behaviour of social insects is highly flexible because it depends on the interplay between individual and collective decisions. In ants that use foraging trails, high ant flow may entail traffic problems if different workers vary widely in their walking speed. Slow ants carrying extra-large loads in the leaf-cutting ant *Atta cephalotes* L. (Hymenoptera: Formicidae) are characterized as 'highly-laden' ants, and their effect on delaying other laden ants is analyzed. Highly-laden ants carry loads that are 100% larger and show a 50% greater load-carrying capacity (i.e. load size/body size) than 'ordinary-laden' ants. Field manipulations reveal that these slow ants carrying extra-large loads can reduce the walking speed of the laden ants behind them by up to 50%. Moreover, the percentage of highly-laden ants decreases at high ant flow. Because the delaying effect of highly-laden ants on nest-mates is enhanced at high traffic levels, these results suggest that load size might

be adjusted to reduce the negative effect on the rate of foraging input to the colony. Several causes have been proposed to explain why leaf-cutting ants cut and carry leaf fragments of sizes below their individual capacities. The avoidance of delay in laden nest-mates is suggested as another novel factor related to traffic flow that also might affect load size selection. The results of the present study illustrate how leaf-cutting ants are able to reduce their individual carrying performance to maximize the overall colony performance.

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