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Productividad en cebada maltera. I. uso de factoriales 2k en el estudio integrado de factores controlables e incontrolables

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### Abstract

When studying crop response to controlled factors of production (CFP), a matrix experimental design is used to allow for the orthogonal treatment of those factors. Studying crop response to interactions between uncontrolled and controlled factors of production requires methodologies that assure the orthogonal treatment of both types of factors. Typically, the experiment involving the CFP is repeated over a set of locations and years. A 26 Factorial Experimental Design with four replications was used to study the response of malting barley (*Hordeum vulgare* L.) in the state of Puebla, Tlaxcala and Hidalgo during the spring-summer cycle of 1995. Five CFP were used: 1) 60 and 90 kg ha<sup>-1</sup> of N fertilizer (N); 2) 0 and 40 kg ha<sup>-1</sup> of P<sub>2</sub>O<sub>5</sub> (P); 3) 0 and 30 kg ha<sup>-1</sup> of K<sub>2</sub>O (K); 4) 120 and 160 kg ha<sup>-1</sup> seed rate (D); 5) two barley cultivars, Esmeralda and M-102631(V) and 6) an incontrolled factor of production. Locations with less and more than 400 mm rainfall in the growing season (L). The 26 factorial experiment was organized into split plot designs that included factors N, P, K, D and L in the main plots, and cultivars in the sub-plots. Factorial effects of L and the N\*P\*K\*D interaction were used as defining contrasts for blocking to the (1/4)<sup>o</sup> level. The 16 large plots and two small plots in each were assigned to each, of eight experimental locations. Barley responded to all six factors of production either as main effects or as interactions of two, three or four factors. Responses to N fertilizer and to seeding rates were as two, three and four factor interactions. The response to P and K fertilizers and to rainfall and to cultivar were recorded as main effects and as two, three and four factors interactions. Treatments associated to higher net incomes were 90-40-30-120 (N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O-seeding rate) for Esmeralda cultivar and 60-00-30-120 for cultivar M-102631, when rainfall was less than 400 mm; and 60-40-30-120 for cultivar Esmeralda and 90-40-00-120 for M-102631 cultivar when total rainfall was higher than 400 mm. Due to a large interaction between L and the N, P, K and V factors, best agronomic treatments were different for each cultivar in the different rainfall levels of L.

### Keywords

Barley, factorial experiments, fertilization, seeding rates, *Hordeum vulgare*.

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