LAMBSQUARTER (*CHENOPODIUM ALBUM*) AND NUTSEDGE (*CYPERUS* SPP) INTERFERENCE IN DRY BEAN YIELD

Alberto Pedreros and Juan Tay
INIA Quilamapu
Casilla 426, Chillán, Chile
e-mail : alberto.pedreros@inia.cl

Introduction

Production of dry beans is affected by several flush of weeds during crop development, and yield can decreases more than 60% under central valley conditions of Chile. On the other side, needs of irrigation to obtain high yield, increases emergence of new weed flushes, after herbicides spraying. Use of herbicide is the most important weed control system, however species such us lambsquarters (*Chenopodium album*) is not controlled by treatments, while nutsedge (*Cyperus* spp) is able to regrowth from vegetative structures (Pedreros, 1993; Tay et al., 2005) This condition means that, in spite of excellent weed control by herbicides, both species are interfering with growing of bean, and at harvest time, high populations of them affects harvest. The objective of these experiments was to evaluate the competitive effect of uncontrolled lambsquarters and nutsedge plants on dry bean production.

Materials and Methods

Bean cvs. Curi-INIA and Blanco-INIA were planted during 2000-2001 and 2002-2003 seasons to evaluate competitive effect of different densities of nutsedge and lambsquarters respectively, on dry yield. An additive design with four replications in a randomized complete block was utilized in both experiments. Both seasons, beans were planted the first week of November, at densities of 30 plants per m2 with a distance of 0.5 m between rows, in plots 5 m long by 2 m wide. Nutsedge and lambsquarters plants were maintained at densities of 0, 1, 2, 4, 16, 64 y 128 plants per m^2 during all season, considering those plants emerged in a 12 cm wide band around each bean row. This simulated weeds not controlled mechanically. Grasses were controlled with clethodim at 0.24 kg/ha, while broadleaves were controlled with fomesafen at 0.25 kg/ha. New weed flushes were hand removed every three weeks until harvest. Two central rows were used to record production in which bean yield was analyzed using regression analysis.

The relation between weed density with crop yield has been described by the rectangular hyperbolic curve (Cousens, 1985). This model predict crop response yield as follows:

$$Y = Ywf\,(1\text{-}id/100(1+id/a))$$

where Y is the predicted yield as function of weed density, Ywf is the estimated weed-free crop yield, *i* is the initial slope or the percentage of crop loss per unit of weed population as *d* approaches to zero, *a* is the maximum corn lost yield loss as *d* approaches to infinity, and *d* is weed density. In these experiments yield was expressed as a percentage of lost by the model:

$$Yl = id/(1+ id/a)$$

where Yl is the percentage corn yield loss.

Results

The relation between bean yield and nutsedge density is presented in Figure 1. The hyperbolic model fitted the data with and equation of high significance ($P<0.001$). Estimating bean yield due to nutsedge population and fitted with equation, showed an $r^2 = 0.83$. This equation, in this experiment, predicts that 1 nutsedge/m^2 will reduce bean yield in 4.9% and 10 nutsedges/m^2 will reduce in 29%. The maximum expected loss, in this experiment with 128 nutsedges per m^2, was about 59% or 1800 kg ha.

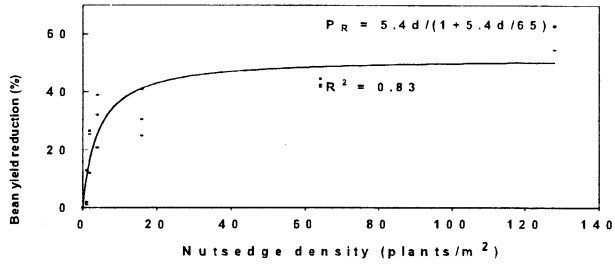

Figure 1. Effect of nutsedge density on dry bean yield reduction, Chillan, Chile 2000-2001.

The relation between lambsquarters density and dry bean reduction yield is presented in Figure 2. The hyperbolic model fitted the data with high significance ($P<0.001$). Estimating bean yield due to lambsquarters population and fitted with equation, showed and $r^2 = 0.82$. This equation, predicts that 1 lambsquarterse/m^2 will reduce bean yield in 1.1% and 10 lambsquarters/m^2 will reduce in 8.9%, this mean 32 and 270 kg/ha respectively. The maximum expected loss, in this experiment with 128 lambsquarters per m^2, was about 33% or 1000 kg/ha of dry bean.

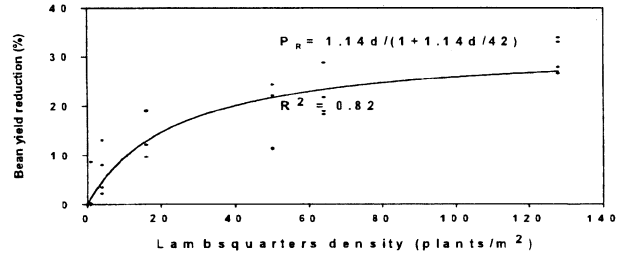

Figure 2. Effect of lambsquarters density on dry bean yield reduction, Los Angeles, Chile 2002-2003.

References

Cousens, R. D. 1985. A simple model relating yield loss to weed density. Annals of Applied Biology 107: 239-252.

Pedreros, A. 1993. Importancia de las malezas en frejol. Investigación y Progreso Agropecuario Quilamapu N° 58: 33-36.

Tay, J., A. Pedreros y A. France. 2005. Producción de poroto en el provincia del Bío Bío. Informativo Agropecuario Bioleche - INIA Quilamapu, 18(3) :38-40.