In organic agriculture seeds must be organic and in organic seed crops of lucerne weeds and diseases have a key role in limiting suitable environmental conditions, by increasing the production costs and often not ensuring standard seed quality. The effect of row spacing (30 and 50 cm) and seed density (300, 600 and 900 seeds m-2, equivalent to 5, 10 and 15 kg of seeds ha-1) on seed yield and its components (number of fertile stems, number of inflorescences per stem, flowers per raceme, pod set, seed per pod, seed set) of an organic seed crop of lucerne were assessed in a split-plot experimental design with four replicates, with row spacing as main plot and seed density as split plot. The experiment includes also a control treatment based on 900 seeds m-2 sown in paired rows, at 12 cm within pair and 70 cm between pairs. The experiment comprised three lucerne varieties, chosen on purpose with contrasting size of their genetic base: Ecotipo Romagnolo (with the largest genetic base), Cuore Verde (a variety registered for organic agriculture and intermediate), and Syn-2 (a syntetic derived by intercrossing 10 genotypes). The results indicate that in a specialized, organic seed crop of lucerne, the increased sowing density from 5 to 15 kg ha-1, greatly improves the crop competitiveness within the row against weeds; weeds presents between rows are easily controlled by split-hoe cultivation. Seed yields in 2006 were generally low and some of the seed yield components indicate that the narrowest row spacing and the low sowing densities enhances the number of reproductive stems and the total number of inflorescences m-2. The three varieties responded in different way to row spacing and sowing density in terms of number of flowers m-2 and other seed yield components. The realized seed yields were only 1% of the potential yields estimated through the available ovules per unit area.