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# Drip irrigation management in different chufa planting strategies: yield and irrigation water use efficiency

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In a study presented in the EGU assembly 2012, it was analysed how yield and irrigation water use efficiency (IWUE) in chufa (*Cyperus esculentus L. var. sativus*), crop, were affected by planting strategy (ridges and flat raised beds, with two and three plant rows along them) and irrigation system [furrow (FI) and drip irrigation (DI)]. Each irrigation session started when the Volumetric Soil Water Content (VSWC) in ridges dropped to 80% of field capacity; beds were irrigated simultaneously with ridges and with the same irrigation duration. R produced lower yield than the two types of beds, and yields in DI were higher than those FI. Ridges led to the highest IWUE with DI, and to the lowest with FI. Then, it was decided to analyse, in DI, how yield and IWUE responded to start each irrigation session when the VSWC in the central point of different planting strategies [ridges (R), and flat raised beds with two (b) and three (B) plant rows along them] dropped to 80% of field capacity. In R and b, plants were irrigated by a single dripline per plant row, while in B two irrigation layouts were assayed: a single dripline per plant row (B3) and two driplines per bed (B2), placing each dripline between two planting rows. Irrigation session stop was also automated as a function of the VSWC. Results show that yield was affected ($P \leq 0.01$) by planting strategy; the greatest yield was obtained in b (2.4 kg•m$^{-2}$), differing ($P \leq 0.05$) from that obtained in R (2.1 kg•m$^{-2}$), with intermediate yields in B2 (2.3 kg•m$^{-2}$) and B3 (2.3 kg•m$^{-2}$). Yield was not affected ($P \leq 0.05$) by the utilisation of two or three driplines in B. Considerably less irrigation water was applied (IWA) in R (376 mm) than in B3 (465 mm), B2 (475 mm) and b (502 mm). This automatic irrigation management, as a function of the VSWC in each planting strategy, lead to adjust the IWA to the plant water requirements, which were similar in all three flat raised beds, since they correspond to the same planting density, that was, in turn, higher than in R. IWUE was affected ($P \leq 0.01$) by the planting strategy, obtaining greater ($P \leq 0.05$) values in R (5.54 kg•m$^{-3}$) than in B3 (4.84 kg•m$^{-3}$), B2 (4.76 kg•m$^{-3}$), and b (4.73 kg•m$^{-3}$). With the herein presented irrigation management, IWUE in flat raised beds considerably increased in relation to the previous experiments (automated as a function of the VSWC in R), although they resulted in lower values ($P \leq 0.05$) than in R. When comparing the different planting rows, neither the yield nor the average tuber weight was affected by their position. b leaded to the highest yield, while R resulted in the lowest yield, but with the highest IWUE. Considering the current prices of both tubers and irrigation water, the profit obtained by the increase in yield reached with b is greater than the cost that supposes its greater IWA. Nevertheless, if there were water delivery restrictions or price increases, R would represent a recommendable strategy.