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Optimisation of Cow Manure and Leaf Spraying Rate on Stigma Yield and Quality Criteria of Saffron Using Response-Surface Methodology

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Abstract

Response- surface methodology (RSM) is defined as a set of statistical techniques that are used to optimise a product. In this work, optimisation of cow manure and leaf spraying of saffron using RSM was done. In this study, optimisation of cow manure and leaf spraying rate of saffron using response–surface methodology was done. An experiment was conducted with 13 treatments with two replications at the Agricultural Research Field of Ferdowsi University of Mashhad, Iran during two growing seasons of 2015–2016 and 2016–2017. The treatments were allocated based on low and high levels of cow manure (0 and 100 t ha^{-1}, respectively) and leaf spraying concentrations with Dalfard ® (0 and 10 ppm, respectively). Lack-of-fit test was used to evaluate the quality of the fitted model. The quality of the fitted models was judged using the determination coefficient (R^2). The results showed that effect of linear component was significant on quality characteristics. Effect of square component was significant on dried weight of stigma, and crocin content. Interaction effect of full quadratic component was significant on stigma yield criteria. The highest observed value for dried stigma yield was related to 100 t cow manure per ha+ no leaf spraying (with 2.45 g m^{-2}). The maximum observed amounts for picrocrocin, safranal and crocin were related to 100 t cow manure per ha+ 10 ppm leaf spraying. In general, it seems that resource use optimisation especially fertilisers based on Response- surface methodology may be cropping approach for sustainable production and improvement of yield stigma yield and quality characteristics in saffron.

Keywords: Crocin, lack-of-fit test, picrocrocin, safranal

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