Physiological studies on gerbera plants

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SUMMARYThe experimental study was carried out at the Experimental Farm, of the Faculty of Agriculture at Moshtohor, Benha University, during three successive seasons (2002/2003), (2003/2004) and (2004/2005).The aim of the study was how to improve, the flowering characters and production of offsets of Gerbera jamesonii L. by chemical fertilization using (ammonium nitrate (NO3NH4) at 100, 150 and 200 g/plot, calcium super phosphate (P2O5) at 100, 150 and 200 g/plot and potassium nitrate (KNO3) at 100, 150 and 200 g/plot, NPK at 100: 100: 100 and 200: 100: 100 g/plot). The amount of N, K fertilizers were divided to three equal parts and was added as a side dressing at one month interval after transplanting. However, all the amount of P was added during preparing the soil.Another part included the effect of irrigation intervals (7, 10 days; 10, 15 days and 13, 20 days in summer and winter, respectively).Also, studying the biochemical effect of gerbera plants extract, which resulted from the best fertilization and irrigation treatments, on some pathogenic fungi (Fusarium solani, Fusarium oxysporum, Rhizoctonia solai and Alternaria solani).The most important results are as following: A. The first part:Effect of chemical fertilization N, P, K and NPK on vegetative growth, flowering and chemical composition: The following results were obtained:1-The highest number of leaves / plant resulted from plants (aged one year) treated with N2PIKI at 200: 100: 100 g/plot or NIPIKI at 100: 100: 100 g/plot for two years-old plants.2-The longest leaf resulted from treating plants with NPK fertilization at the first rate (100: 100: 100 g/plot) for both ages.3-The highest number of offsets (daughter plants)/plant was produced by NPK treatment at 100: 100: 100 g/plot for both ages.4-The heaviest fresh and dry weight of vegetative parts, to plants have one year old plants, resulted from fertilizing with N2P1K, (200: 100: 100 g/plot), but the good treatment for the plants of two years old was NI P, K, (100: 100: 100 g/plot).5-The highest number of flower heads / plant resulted with NPK mixed fertilization at N2PIKI (200: 100: 100 g/plot).6-The widest flower head diameter of gerbera wasproduced with plants which received N,PIKI fertilization (200: 100: 100 g/plot).7-The tallest flower head stem resulted from plants treated with N,PIKI (200: 100: 100 g/plot) or NIPIKI (100: 100: 100 g/plot).8-The thickest flower head stem resulted from the application N2PIK, at (100: 100: 100 g/plot).9-The heaviest fresh and dry weights of flower head and stem resulted from plants treated with NIP i K1 fertilization at (100: 100: 100 g/plot).10-The heaviest fresh and dry weights of roots/plant resulted from treating plants with NPK at 100 : 100 : 100 g/plot or 200: 100: 100 g/plot.11-The total nitrogen percentage in leaves, flowers and roots of gerbera plants was increased with increasing nitrogen fertilization level.12-Phosphorus percentage in the leaves and roots increased with increasing the level of phosphorus fertilization, but the increment in the flowers was due to NIP1K1 at 100: 100: 100 g/plot.13-High fertilization level of potassium at 200 g/plot and nitrogen at 200 g/plot or N2P1K1 at 200: 100: 100 g/plot gave the highest increase in the percentage of potassium in the leaves, flowers and roots for both ages.14-Total carbohydrates % was increased in the leaves and flowers with the treatment pf N,PIKI at 200: 100: 100 g/plot, while the treatment of N3 at 200 g/plot gave the highest of total carbohydrates percentage of roots for both ages.B. The second part:Effect of irrigation intervals on vegetative growth, flowering and chemical composition: The following results were obtained:1-The highest number of leaves / plants (one year old), resulted from plants treated with the first rate of irrigation ”A” at 7 days in summer and 10 days in winter, while for plants of two years old the suitable irrigation interval as ”B” was at 10 days in summer and 15 days in winter.2-The longest leaves resulted from plants treated with the first irrigation rate ”A” at 7 days in summer and 10 days in

winter.3-The highest number of offsets (daughter plants)/plant was produced by the rate of irrigation ”A” at 7 days in summer and 10 days in winter for one aged year plants, but the moderate irrigation interval ”B” gave the greatest number of offsets for plants aged two years.4-Irrigation interval ”A” every 7 days in summer and 10 days in winter resulted the heaviest fresh and dry weights of vegetative parts / plant aged one year old, and irrigation ”B” every 10 days in summer and 15 days in winter led to this for plants aged two years old.5-The highest number of flower heads / plant aged two years, resulted from plants irrigated every 10 days in summer and 15 days in winter, but with one year old plants the most favourite treatment was the short irrigation period.6-The widest flower head diameter of plants aged two years old, resulted from irrigation ”B” every 10 days in summer and 15 days in winter, and irrigation ”A” every 7 days in summer and 10 days in winter for plants aged one year old.7-The longest flower head stem / plant for plants aged two years, was produced with the moderate irrigation interval ”B” every 10 days in summer and 15 days in winter, and from irrigation ”A” with plants aged one year only.8-The thickest flower head stem/plant resulted from irrigation period ”B” (every 10 days in summer and 15 days in winter) for both ages.9-The heaviest fresh and dry weights of flower heads and stems / plant resulted from one year old plants treated with the first rate of irrigation ”A” (every 7 days in summer and 10 days in winter), and the moderate irrigation rate ”B” (every 10 days in summer and 15 days in winter) for plants aged two years old.10-The heaviest fresh and dry weights of roots/plant for plants, aged one year, resulted from irrigation ”A” every 7 days in summer and 10 days in winter, while, the heaviest weights for plants aged two years old, resulted from irrigation ”B” every 10 days in summer and 15 days in winter.11-The short irrigation periods (every 7 days in summer and 10 day in winter) gave the highest nitrogen percentage in both the leaves and flowers.12-Phosphorus percentage in the different parts of gerbera plants, was the highest with the moderate irrigation period ”B” (every 10 days in summer and 15 days in winter).13-Irrigation period ”B” (every 10 days in summer and 15 days in winter) gave the highest potassium percentage in the leaves and flowers.14-Total carbohydrates % increased to the highest with the moderate period of irrigation, while, the short or long irrigation periods decreased total carbohydrates in the different parts. Antimicrobial activity:1-The highest effect for gerbera plant extract against pathogenic diseases resulted from treating plants with N2P1K 1 at 200: 100: 100 g / plot, followed by N2 at 150 g/plot and NI PI K1 at 100: 100: 100 g/plot, respectively.2-Methanolic extract gave more effect on the pathogenic fungi than the water extract.3-The most effect of gerbera plant extract was found with Alternaria solani followed by Fusarium oxysporum and Fusarium solani. whereas, the lowest effect were for Rhizoctonia solani.RECOMMENDATIONfrom the previously mentioned results in could be concluded that, the following treatments can produce healthy plants, good flowers and increase daughter plants (offsprings):1-The fertilization, of plants by using the rate 200: 100: 100 g NPK /m2, while, for production of offsets / plant, the beneficial is NPK at the rate of 100: 100: 100 g/m2.2-The irrigation period (every 7 days in summer and 10 days in winter) is the most effective treatment for the one aged year plants, while the moderate irrigation period (every 10 days in summer and 15 days in winter) is for the plants aged two years.3-The treatment of N2PIKI at 200: 100 : 100 g/plot increased antimicrobial substances and gave the highest effect against fungal species as alcoholic extraction and followed by N2 at 150 g/plot which gave the second effect. The fertilizers used as:Ammonium nitrate (33.3% N).Calcium super phosphate (15.5% P205). Potassium nitrate (44% K70).