Effect of some growth regulators and fertilizer on growth and fruiting of (vitis vinifera l.) grapevines

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The present study was carried out during two consecutive seasons of(1993 / 1994) and 1994 / 1995) on 12 years old Thompson Seedlessgrapevines, growing in a clay loamy soil in a private vineyard at Samannudregion Gharbia Governorat, Egypt to study the effect of some growthregulators i.e. Dormex (H2CN2), GA3 and NAA and nutrient elements i.eZn S04, KN03 and urea,on growth and fruiting of Seedless grapevines.The study was dealing with spraying the dormant one year old woodonly canes after pruning with the following growth regulators and nutrientsolutions.1- Control (vines were sprayed with water).2- Dormex (H2CN2) at 1.250/0. 3- Donnex (H2CN2) at 2.50/0 .4- Donnex· (H2CN2) at 5% . 5- GA3 at 50 ppm.6- GA3 at 1000 ppm. 7- NAA at 25 ppm.8- NAA at 250 ppm. 9- KN03 at 5%.10- Zn S04 at 25% . 11- Urea at 10 %.The above treatments were sprayed once at the following dates.On 15ID Dec., Jan., lill at 15!!!. and Feb. 19.The experiment was designed according to the randomizedcompletely block design to study the followingI-The effect of these treatments on the phonological phases of thegrapevines i.e. Time of the begining of budburst, begining of bloomingend of blooming, begining of ripening stage (Veraison) and date ofharvesting date.2-The buds free ammo acids, total soluble and non-soluble sugars.contents.3-Bud behaviour (budburst percentage, fruitful shoots % and number ofclusters per vine).4- Yield per vine.5- Physical properties of clusters and berries.6- Fruit quality (T.S.S. sugar and total acidity).The obtained results could be summarized as follows :-t _ The effect of spraying some growth regulators and nutrient elements onthe phynological phases.1- Budbursta- Spraying grapevines at dormant season with Donnex (H2CN2) causedan earling of budburst from 66 to 7 days depending upon theoncentration and date of spraying, the early application and highconcentration(2.5 and 50/0)were more effective in this respect.b- Spraying KN03 at 5% and urea at 10 % enhanced budburst with a fewdays.c- Spraying GA3, NAA and Zn S04 delayed budburst than the control.d- GA3 application at 50 and 1000 ppm and NAA at 250 ppm gave thelatest budburst, since these treatments delayed the budburst by about10 to 14 days than the control.e- The more effective treatments on delaying budburst were GA3 onJanuary 1g and NAA on February 1g at high concentration.2- Time of Blooming:a- Donnex (H2CN2) at 15 !h Dec. caused an earliness ill time of begining ofblooming by 40 to 50 and 32 to 39 days, in the first and second seasonrespectively. While in the later application Feb 1st was from 10 to 21and from 16-21 days in the first and second seasons respectively.b- Application of urea at 10 % advanced blooming date from 5 to 13 and10 to 18 days than the control in the first and second seasonsrespectively.c- Conversely GA3 application and Zn S04 at two early dates and NAA atthe two later dates delayed time of blooming in comparison with thecontrol.3- Time of Harvesting:a- Donnex (H2CN2) was more effective agents in earliness in harvestingdate of Thompson Seedless grape the number of earlines in daysranged from 20 to 30 days in two seasons of study in comparison withthe control.b-Urea application at 10 % at 15 Jan. and Feb. 1g advanced harvestingdate by about 10 to 15 days than the control in the two seasons of study.c- Also spraying grapevines with KN03 at 50/0 on Jan 1st,15 Jan and Feb.1it advanced harvesting date by about 10-20 days.d- On the other hand GA3 application at 50 and 1000 ppm and NAA at 25and 250 ppm delayed harvesting time by about 5 to 10 days.11-Chemical Composition of Buds at Dormancy.1- Total free amino acids.Total free amino acids buds content were significantly affected withutrient elements and the date of spraying.The

highest values in this respect resulated from spraying Donnex(H2CN2) at 5,2.5 and 1.25 0/0. Also applying KN03 at 5%, Zn 504 at 250/0 and urea at 10 % significantly increased total free amino acids buds.content than the control but less than Donnex (H2CN2).The lowest values resulted from spraying GA3 at 50, 1000 ppm andNAA at 25, 250 ppm in both seasons of study. Also applying these agentson 15 Jan. and Feb. 1~ were more effective in this respect.2- Total soluble sugars,Applying Donnex (H2CN2) at 1.25, 2.5 and 5% KN03 at 5 % .andurea at 10 % in the first season significantly increased total soluble budscontent at dormancy in comparison with the control. Also using aboveagents except urea at 10 % significantly increased total soluble sugrs ofbuds content than the contro1. On the other hand applying GA3 at 50, 1000ppm and NAA at 25, 250 ppm and Zn 804 at 25% and urea at 10 % gavethe lowest values in this respect.Using Dormex (H1CNz) at 50/0on February 1§! gave the highest values111 this respect, while using GA3 at 1000 ppm on 15 Dec. gave the lowestvalues in the two seasons of study.3- Total non-soluble sugers .Spraying Thompson seedless grapevines at dormant season with GA3at 50, 100 ppm and NAA at 250 ppm and Zn S04 at 250/0 significantlyincreased total non-soluble sugars content of buds in comparison with thecontrol and other agents used in this respect during the two seasons ofstudy, NAA at 25 and 250 ppm gave the highest values in this respect. Onthe other hand using Dormex (H2CN2) at 5% gave the lowest values in twoseasons of study. Also applying NAA at 25,520 ppm on 15 Dec gave thehighest values in this respect in both seasons of study, while spraying ureaat 10% on Feb. 1st in the first season and H2CNz at 5% on Feb. 1§! gavethe lowest values in this respect.Spraying above agents at 15 December gave the highest values fromtotal non-soluble buds contents then declined to the lowest values atFebruary 1~ during the two seasons of study.III : Bud Behaviour1- Budburst percentage:Generally the obtained results revealed that early Donnex (hydrogencyanamide) application i.e. at 15 Dec. and Jan. 1Mincreased budburstpercentage, over the control in the two seasons of study. Also sprayingwith GA3 at 1000 ppm on 15 Dec., Zn S04 at 15 Dec. and Jan. II! andurea at Feb. 1M. increased budburst over the control, in the two seasons ofstudy.2- Fruitful shoots Percentage per Vine:Application of Donnex (hydrogen cyanamide) at 2.5 and 5 % hadsignificantlv the greatest percentage of fruit fun shoots in both seasons ofstudy.While spraying with GA3 at 50 and 1000 ppm took the other wayaround. The highest values was obtained, when Donnex (hydrogencyanamide) at 2.5 and 5%, NAA at 25 ppm and Zn S04 at 25% weresprayed on Feb. 1~ . Moreover spraying NAA at 250 ppm on 15 Dec.,KNO., at 5°lclon 15 Dec. and 15 Jan. and urea on 15 Jan. also significantlyincreased percentage of fruitful] shoots over the control in the first season.In the second season spraying hydrogen cyanamide at all usedconcentrations on early date 15 Dec. increased fruitfull shoots precent thanthe control.While the best treatments in this respect were spraying Dormex(H2CN2) at 2.5 and 5;0/0 on Feb. 1§t and KN03 on 15 JAN. On the otherhand all other treatments decreased the percent of fruitfull shoots in thesecond season.3- Number of Clusters per Vine.Spraying dormex (hydrogen cyanamide) at 2.5 and 5 % and Zn S04at 25 % significantly increased number of flower clusters per vine in thefirst and second seasons srespectively. Conversly all other agents usedtake the other way around.In additioon the later spraying dates i-e. 15 Jan. and Feb. 1Minducedthe highest number of flower clusters per vine regardles of agents used inthe two seasons of study.IV. Yield per Vine:a- Spraying Zn 804 at 25 % on all dates of spraying gave the highestyieldb- Spraying with Donnex (H2CN2) at 2.5 and 5 010 concentrations on twolater dates i-e 15 January and February 1~, also produced significantlyhigher yield, on the other hand lower concentration 1.25 °10 of Donnex(hydrogen cyanamide,) on early spraying dates 15 Dec. and Jan. 1~significantly decreased the yield than the control especially in thesecond season.c- Application of GA3 at 50 and 1000 ppm on the two later dates 15 Jan.and Feb 1~ significantly increased the yield.d- Application of urea at 10 % ppm on 15 Jan. and Feb. pi significantlyincreased the yield over the control, but some what less than the abovetreatments.e- Application of NAA and KN03 111 the second season decreased theyield than the control.V. Physical Properties of Clusters and Berries : 1- Gluster Weieht:In general all used treatments except application of Donnex(hydrogen cyanamide) at 1.25 % significantly increased cluster weightthan the control, in the two seasons of study. Moreover the heaviestclusters were obtained by spraying GA3 at 1000 and 50 ppm and Zn 504 at25 % conversely spraying H2CN2 at 1.25 0/0 on Dec. and Jan pisignificantly decreased cluster weight.2· Berry Weight:Application of Donne x (H2CN2), GA3 and

Zn S04 at dormant seasonsignificantly increased berry weight than the control during the twoseasons of study. Moreover application of Donnex (H2CN2) at 1.25,2.5and 50/0 concentrations gave the highest berry weight. On the other handNAA spraying significantly reduced weight of berries than the control.3- Cluster Stem Percentage:All treatments used significantly increased cluster stem percentage incomparison with the control during the two seasons of study. MoreoverGA~ at 50 and 1000 ppm, urea at 10 % and Zn S04 at 2.5 % were themost effective in this respect.4- Cluster Length:All used treatments except Donnex (H2CN2) significantly increasedcluster length than the control during the two seasons of study.Furthermore GA3 at 50 and 1000 ppm and Zn S04 at 25 o/D gave thehighest significant effect in this respect. On the other hand Dormex(hydrogen cyanamide) application decreased cluster length than thecontrol.5- Cluster Width:All used agens except Donnex (hydrogen cyanamide)significantlydecreased cluster width than the control during the two seasons of study.Moreover spraying Thompson Seedless grapevines with NAA at 25and 250 ppm at all spraying dates gave the lowest values in this respect,during the two seasons of study.6- Berry Length :Spraying Thompson Seedless grapevines at donn ant season withDonnex (H2CN2) at 2.5 and 5 %, GA3 at 50 and 1000 ppm and Zn S04 at250/0, significantly increased berry length than the control and othertreatments in the two seasons of study.7- Berry Width:All used treatments excep Donnex (hydrogen cyanamide) at 2.5 and50/0 concentrations, significantly decreased berry with than the control.the other hand application of Donnex (hydrogen cyanamide), at 2.5 and 50/0 significantly increased berry width than the control during the twoseasons of study.8- Berry Length I Width (Shape index) :All used treatments significantly increased berry length / width(Shape index) than the control during the two seasons of study.Furthermore GA3 application at 50 and 1000 ppm, Zn S04 at 25 %and KN03 at 5 % had the highest values in this respect9· Juice Percentage:The application of GA3 at 1000 ppm was the only treatment thatsignificantly decreased the juice percentage in comparison with the controland other treatments, during the two seasons of study while application ofKN01 at 5 % gave the highest values in this respect, in the two seasons ofstudy.10· Peel Percentage:The application of GA3 at low and hight (50 and 1000 ppm)concentrations gave the highest peel percentage during the two seasons ofstudy. On the other hand application of KN03 at 5 % significantlydecreased peel percentage than the control, during the two seasons ofstudy.Berry Carnical Characteristics:lo ToSoSo Percentage at harvesting date Spraying Thompson Seedless grapevines with .Donnex (H2CN2) at1.25, 2.5 and 5 0/0, KN03 at 5% and urea at 10% at all spraying dates gavethe highest T.S.S. percentage in comparison with the control and otherused agents during the two seasons of study. On the other hand applicationof GA3 at 50 and 1000 ppm, NAA at 25 and 250 ppm and Zn S04 at 25%at all spraying dates gave the lowest values in this respect.2- Total Acidity% :Spraying grapevines at dormant season with Donnex (H2CN2) at1.25, 2.5 and 5 % and KN03 at 5% decreased significantly acidity percentage of berries juice than the control during the two seasons ofstudy. On the contrary the application of GA3 at 50 and) 000 ppm andNAA at 25 and 250 ppm at dormant season significantly increased thetotal acidity in berry juice than the control, during the two seasons ofstudy.3- T.S.S / Acid Ratio :The application of Donnex (H2CN2), KN03 and urea induced thehighest values of T.S.S. / acid ratio. While application of GA3, NAA andZn S04 had the lowest values in this respect, the differences between eachof these treatments and the control were statistically significant.Form the results obtained in our investigation it can be concludedspraying Thompson Seedless grapevines with Donnex (H2CN2) at 1.25,2.5and 5.00/0, KN03 at 5.00/0 and Urea at 10 % induced earlier budburst,blooming and ripening. On the other hand, applying GA3 at 50, 1000 ppm,NAA at 25, 250 ppm and Zn S04 at 25 % delayed budburst, blooming andripening. Donnex (H2CN2) was more effective in inducing earlierharvesting date. Also applying KN03 at 5 % and Urea at 10.0% advancedharvesting date but less than Donnex (H2CN2) alone. The study showedthat applying Donnex (H2CN2), KN03 , Zn 804, Urea and GA3 improvedberry quality and yield. Under similar conditions of this researchapplication of Dormex (H2CN2) at 2.5 % it can be recommended at mid ofJan. and Feb l~, KN03 at 5.0 % and Urea at 10.0 % on one-year oldwood during dormancy can be recommended to induce early ripening ofThompson Seedless grapevines. from obtaining highter yield sprayingGA3 at 50 ppm, Zn S04 at 25 % and NAA at 25, 250 ppm at dormantseason can also be recommended.