Study of some factors affecting growth of pecan seedlings

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The present study was conducted during two consecutiveseasons 1987 and 1988 at the nursery of the Faculty of Agriculture ,Moshtohor . Kalubia Governorate. This investigation aimed to studythe following :-1- The possibility of reducing the dominant habit and downwarddirection of tap root of pecan seedlings in favor of increasingroot branching and better root distribution in the soil.2- Enhancing thc rate of vcgctative growth in the nursery toshorten the period required to produce a nursery tree.3- Encouraging the branching of tree top in favor of forming amore compact tree form.Therefore , the fonowing five experiments were included in the study :Experiment I: Effect of growth regulator sprayson growth 01 pecan seedUngs.Two _ year _ old pecan seedlings were transplanted in earlyFebruary of both seasons. These seedlings were sprayed three timesLe, May, June and July. The growth regulators used were 50 ppmTIBA, 500 ppm 6-furfuryl amino purine, 1000 and 2000 ppm SADHin both seasons. Beside, 1000 and 2000 ppm CCC were used in thefirst scason only. Meanwhile, 50 ppm 6- benzyle amino purine , 100and 200 ppm PP998 treatments were applied in the second seasononly. These treatments were arranged in complete randomizeddesign. The vegetative growth measurements were done from thebeginning of growth and repeated at monthly intervals till September.Other growth parameters were done ’ln mid - January.The obtained results reyealed that :-a-50 ppm TIBA treatment increased the number of lateralshoots per seedling , shoot branching angle , number of leaves perseedling , number of lateral roots , total seedling dry weight shootand root dry weights as well as root : shoot ratio. Such treatmentcaused significant reduction in shoot length without any effect on rootlength.b - 1000 and 2000 ppm SADH treatments relatively increasednumber of lateral shoots and roots per seedling , total seedling dryweight , shoot and root dry weight as well as root : shoot ratio.Meanwhile , SADH treatment decreased shoot length , shootbranching BDgles and number of leaves per seedling (especially lowconcentration).c - 500 ppm 6- turturyle amino purine increased number oflateral shoots per seedling, total seedling dry weight , shoot and rootdry weights as well as root : shoot ratio. Meanwhile. this treatmentreduced shoot length.d _ 1000 and 2000 ppm CCC treatments increased number oflateral shoot per seedling , number of leaves per seedling (especiallyat high concentration) , and number of lateral roots per seedling .e _ 100 and 200 ppm PPsas treatments (applied in the secondseason only) increased number of lateral shoots per seedling ,(mainly 200 ppm) , shoot branching angle , number of lateral rootsper seedling. total seedling dry weight. root and shoot dry weights aswen as root: shoot ratio.. Meanwhile t both concentrations of PPa;38highly reduced shoot length especially at high concentration. Othergrowth parameters did not show any response to PPaea treatments.f _ 50 ppm 6- benzyle amino purine improved shoot branchingangles , and root dry weight Meanwhile, this treatment failed toaffect other growth parameters • when it was applied in the secondseason.Generally t it is safe to conclude that spraying pecan seedlingswith 50 ppm TIBA was the most promising treatment in enhancingbetter distribution of pecan seedling growth.Experiment II: Effect of nutritional sprayson growth of pecan seedlings.In early February 1987 , 2 - year - old pecan seedlings weretransplanted at nursetY rows at 50 em. apart. These seedlings weresprayed three times in May, June and July with one of the fonowingnutritional sprays :-a - Tap .ater spray (control)b - 500 ppm Zinc sulphatec - 5000 ppm uread - 5000 ppm pata.sium sulphateThese treatments were arranged in complete randomizeddesign with three replicates and

each replicate included threeseedlings. The same growth measurements of experiment (I) weredone.The obtained result. could be summarized - folio•• :-I - Seedling growth:a - Both potassium sulphate and urea sprays were superior inenhancing most of the growth parameters of pecan seedlings Le.number of lateral shoots per seedling, total seedling dry weight , rootand shoot dry weights as well as root: shoot ratio.Meanwhile • potassium sulphate and urea sprays effect inreducing shoot length increase could probably be due to the increasein number of lateral shoot&b _ Potassium. sulphate sprays surpassed urea sprays inimproving the branching angles whUe urea sprays surpassed potassiumsulphate treatment in improving stem girth. However, the remaininggrowth parameters were not statistically affected.e _ 500 ppm zinc sulphate sprays increased number of lateralshoots per seedling, shoot branching angle, total seedling dry weight,root dry weight and root: shoot ratio. Other growth parameters werenot affected by this treatment.2 - Leaf nutrient content:a _ Potassium sulphate sprays improved leaf K , Mg and Zncontents.b _ Zinc sulphate sprays increased leaf zinc content only.e _ Urea sprays tncreased leaf N •K , Mg and Zn contents.By analysing the results of Experiment (II) • one can generalizethat 5000 ppm potassium sulphate and 5000 ppm urea were the mosteffective nutritional sprays in enhancing growth parameters of pecanseedlings under the experimental conditions. Experiment III: Effect of mycorrhlzae fungion growth of pecan seedlings.In February 1987 , wooden boxes were tmed with a mixture ofsand and clay at the ratio of 1 : 1. The soil was disinfected with 2 %formalin solution. The soil of the firSt group of boxes was inoculatedin mid _ January with Glomus rDIflcrt1CaJPus fungi. whl1e the secondone was inoculated with Glomus austral/! fungL Meanwhile, thethird group of boxes was left without inoculation 8S control. Moreover•the fourth group of bos.es was filled with unsterilized soil as a generalcontroL Seedlings with pnmed roots at 15 em. below the crown wereplanted in the previously prepared boxes. The treatments werearranged in complete randomized design.The obtained results reycaled that :-8 _ Glomus IIUStrs1/! fungi proved to be more effective inimproving seedling growth parameters as it greatly increased lateralshoots per seedling, number of leaves per seedling • root length •number of feeder roots per seedling. total seedling dry weight • shootand root dIy weight& Meanwhile. it reduced the ratio of root : shootdry weightb _ Glomus JDIICJY1CSIPU8 fungi showed to be less effective inimproving seedling growth. However, it increased shoot length •root length • number of feeder roots per seedling , total seedling dryweight • shoot and root dry weights. Other growth parameters didnot show any response to mycorrhlzae inoculation.c - Soil sterilization failed to improve any growth parameters ofpecan seedlings.It could be concluded from Experiment (III) t that growth ofpecan seedlings respond well to soil inoculation by mycorrhizaeGlomus BustraJe fungi proved to be more effective than G1o.-!DUBmacrt1C1l1pusin improving growth of pecan seedlings in the nursery.Experiment IV: Response 01 pecan seedlings to soiltreatment witb some cbemtcals.In February 1987 t wooden boxes. 100 X 75 X 50 em. (length ,width' height) were filled with a mixture of sand and clay at the ratioof 1 : 1. The soU was subjected to the following treatments :-a - Silver nitrate was applied at the rate of OJJ7 moles I m2surface area t above the base of the box by 5 em. t then the boxes werecompleted with the soiLb - Zinc sulphate was applied at the rate of 2.0 moles , m2surface area t above the base of the box by 5 em. • then the boxes werecompleted with the soiLc - SollJeft without any chemical treatment as a control1 - year - old pecan seedlings with pruned roots at 15 em. belowthe crown were transplanted in the previously prepared boxes.The treatments were arranged in complete randomized design.The obtained results revealed that :Silver nitrate and zinc sulphate treatments at the concentrationsused in this experiment failed to exert a root pnming effect on pecanseedlings. However they affected seedling growth parameters as theyincreased number of leaves per seedling and total seedling dry weightonly. Moreover. zinc sulphate treatment increased root length androot dry weightEvaluating results of experiment (IV)• it is easy to say that sUvernitrate and zinc sulphate treatments improved some growthparameters of pecan seedlings. However. these treatments failed • atthe concentrations applied • to exert the expected root pruning effectby killing the root tip at a certain depth.Experiment V: Response of pecan seedlingsto some root treatments.In both 1987 and 1988 seasons , 1 - year - old pecan seedlingswere root pruned at 15 em. below the crown • then , they receivedone of the fonowing treatments :-a - Planting directly without treatment (control).b - Wounding the base of the seedling roots by applying twoopposite

cuts (2 em length).c _ Wounding and dipping seedling roots in 1000 and 2000 ppmIndole butyric acid (lBA).d _ Wounding and dipping seedling roots in 500 and 1000 ppmNaphthalene Acetic Acid (NAA).e _ Wounding and dipping seedling roots in 600 ppm Benomyle.!_ Wounding and dipping seedling roots in 1000 ppm lBA +eoo ppm Benomyl.g _ Wounding and dipping seedling roots in 500 ppm NAA+ 600ppm Benomyth _Wounding and dipping seedling roots in 1000 ppm IBA +500 ppm NAA+ 600 ppm BenomylThese treatments were arranged in complete randomizeddesign. The obtained results could be summarized as follows :-a _ Root shortening + wounding increased number of leaves andnumber of lateral roots per seedling and total seedling dry weight.Meanwhile • it reduced root length and root: shoot ratio.b _ Root shortening + wounding + 1000 or 2000 ppm IBAtreatments were morc cffcctivc as they increascd numbcr of leavesand number of lateral roots per seedling , root length • total seedlingdry weight • shoot and root dry weights. Meanwhile. shoot lengthwas re4lJced when 1000 ppm IBA W8B used. Anyhow. the high thelBA concentration. the more was improving effect on seedling growth.c _ (Root shortening + wounding + 600 ppm Benomyl + 1000ppm lBA) • (root shortening + wounding + 600 ppm Benomyl + 500ppm NAA) , and (root shortening + wounding + 600 Benomyl + 1000lBA + 500 ppm NAA) treatments increased number ot leaves andnumber of lateral roots per seedling , total seedling dry weight , shootand root dry weights. The last mentioned treatment exerted moreeffect than the others.from Experiment (V)• one can conclude that root shortening +wounding + dipping in 2000 ppm lBA solution is the most promisingroot treatment In improving growth ot one - year- old pecan seedlings.