Effect of soil conditionerson some physical and chemical properties in some egyptian soils

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This work was carried out to’investigate theuse of some synthetic materials (polyvinyl alcohol”PVAn, Polyvinyl acetate ”PVAc” and Bitumen) as wellas natural materials (Shale, Farmyard manure ”FYM”and Gypsum) as soil conditioners on three soils. Thesoils were (a) a sandy soil from EI-Salheya, (b) asandy clay loam calcareous soil from El-Nobareya, and(c) a sandy clay loam saline-sodic soil from Abeece.Two greenhouse experiments were carried out on thefirst two soils using barley as an indicator plant,and a laboratory experiment was carried out on thethird soil. Treatments involved application of conditionersin different manners: (a) each applied singly,(b) each applied in combination with FYM (in the caseof the first two soils), and (c) each applied in combinationwith gypsum (in the case of the third soil).Shale was used only with the first soil, and gypsumwas used only with the third one.applications of conditioners wereThree rates ofused. Theywere as follows: PVA (or PVAc): 0.67%, 1.00 and 1.33%;Bitumen: 1.00, 1.50% and 2.00%: FYM : 1.33, 2.00% and2.67% and shale 4.67%, 7.00% and 9.33%.Results with the first two soils indicated thatall conditioners showed improvement in soil properties,as they decreased bulk density and increased soil aggregation.aggregation index ”AI”. mean weight diameter”MWD”. Wind erosion index ”WEI”, pore size distribution~soi 1 water retention and avail abl e moi sture particularlywith increasing their rates of application.As an example of effect on the sandy soil, duringits 45 days following experiments, the treatedconditioned soil showed 48%, 46%, 37%, 36% and 30%total aggregates in the cases of Bitumen. PVAc, shale,PVA and FYM, respectively (average of three rates),while untreated soil had total aggregates of 14%.Totalporosity values for the same soil during the same periodwere 38%, 47%, 46%, 45%. 44% and 42% for control, Bitumen,PVAc, FYM, PVA and shale treatments, respectively.Bulk densities of the treatments were 1.62,1 •32, 1. 42, 1. 46, 1. 47 and 1. 51 for the con tr 0 l, Bitumen,PVAc, PVA, FYM and shale, respectively.In the sandy soil, treatments receiving both FYMand shale led to a slight increase in electric conductivity”EC” of the soil extract~ apparently due to theimproved conditions for plant growth which led to morewater being used during the season, as well as saltcontents of the materials.Also, the cation exchangecapacity increased from 1.54 meq/l00 g for the controlto 1.69, 1.64 and 1.63 for PVA, PVAc, and Bitumen, respectivelyas compared with 5.41 and 4.27 for shaleand FYM, which could be due to the colloidal natureof the last two materials.The other heavier soil showed similar results.This soil being rather saline (EC = 6.16 mmhos/cm/2SoC),all treatments and the control showed at the end of theexperiment~values of EC smaller than the initial EC,due to leaching.Compared with the control, FYM inparticular showed higher EC values which may have beendue to its relativelY high content of salts.Time duration led to a decrease in the improvementson physical and chemical properties alreadyoccurred following application, particularly with FYM,apparently due to the decay of the conditioning materials.Treatments receiving shale showed the least change withtime reflecting its stability.Application of conditioners caused a delay anda decrease in seed germination possibly due to imperviouslayers formed around seeds, but eventually plantgrowth as well as its uptake of N, P and K were increased.Treatments receiving soil conditioners incombination with FYM also showed patterns of responsesimilar to those where conditioners were appliedsingly; however the magnitude of the response wasgreater.Time duration, also led to a decrease in theimprovements and the extent was greater in this respectthan when conditioners were applied singly.Results of the

laboratory experiment (the thirdsoil) showed improvement of soil physical properties byapplication of soil conditioners.Salinity and exchangeab1esodium percentage ”ESP” were decreased by applicationof conditioners.EC waS originally 7.88 mmhos/cm/250C, it decreased to reach a value of nearly onesixth that of the original. ESP was 19.20 originally;it decreased to as low as 4.30% by treatmentsgiving an indication of a decrease in EC of all treatmentsduring the course of experiment.conditionersapplied in combination with gypsum were more effectivein improving soil physical and chemical properties thanwhen applied singly.