

GROEI EN ONTWIKKELING VAN SOJABOONCULTIVARS BY VERSKILLEND RYWYDTE

deur

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Voorgelê ter gedeeltelike vervulling van die graad

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Bloemfontein

2004

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OPSOMMING

Groei en ontwikkeling van sojabooncultivars by verskillende rywydtes.

Verskeie studies in veral die Verenigde State van Amerika het getoon dat sojabone hoër opbrengste by nouer as wyer rye produseer. Die hoër opbrengste word meestal aan beter stralingsonderskepping weens 'n hoër blaaroppervlak-indeks toegeskryf. 'n Digter blaredak verhoog waterverbruiksdoeleltreffendheid en verlaag onkruidkompetisie.

Daarom is die invloed van cultivars en rywydtes op die groei en ontwikkeling van sojabone onder plaaslike toestande geëvalueer. Die proewe is op twee uiteenlopende lokaliteite, naamlik Bergville, Kwazulu-Natal, en Bloemfontein, Vrystaat, gedurende die 2000/01 en 2001/02 groeiseisoene met ses cultivars (PAN660/564, Dumela, A5409, LS666, Tops en SNK500) en twee rywydtes (0.45 en 0.90 m) herhaal. Daar is sover moontlik gepoog om by kommersiële verbouingspraktyke te hou of na te boots.

Verskeie plantfisiologiese komponente is gemeet, naamlik tydens die blomstadium: planthoogte, blaarmassa, stingelmassa, aantal blare, aantal sytakke en blaaroppervlak-indeks; en tydens die fisiologies rypstadium: aantal peule, peulmassa en saadmassa. Gedurende die blomstadium is die voedingstofkonsentrasies in die bogrondse plantmateriaal ook bepaal. Die waterverbruiksdoeleltreffendheid oor die groeiseisoen is ook gekwantifiseer.

Nie die cultivars of die rywydtes het enige noemenswaardige invloed op die voedingstofkonsentrasies in die bogrondse plantmateriaal gehad nie. Die waterverbruiksdoeleltreffendheid, alhoewel dit nie statisties ontleed kon word nie, was deurgaans hoër by die nouer as die wyer rye.

Met bykans alle bogrondse plantkomponente wat gemeet is, is gevind dat dieselfde cultivars hoër waardes by die 0.45 as 0.90 m rye gehad het. Die een plantkomponent wat in die verband uitgesonder moet word, is die aantal sytakke wat per eenheidsoppervlak

gevorm het. Wanneer die sojabone teen dieselfde stand by die 0.45 teenoor die 0.90 m rye geplant word is die afstand tussen aangrensende plante twee keer so ver by die nouer (0.074 m) as wyer (0.037 m) rye. Die gevolg daarvan was dat die sojabone in die nouer rye bykans deurgaans betekenisvol meer sytakke as in die wyer rye gevorm het.

Die meer sytakke by die nouer rye het ook 'n meer bosagtige plant tot gevolg gehad wat vinniger in breedte toegeneem het. As gevolg hiervan, tesame met die kleiner afstand tussen die aangrensende rye, is die grondoppervlakte gouer bedek en daarom is 'n hoër blaaroppervlakte-indeks by die nouer as wyer rye gevind. Hierdie hoër blaaroppervlakte-indeks by nouer as wyer rye is soortgelyk aan resultate wat deur verskeie ander navorsers gerapporteer is. Volgens hulle het die hoër blaaroppervlakte-indeks tot vervroegde en verhoogde stralingsonderskepping gelei. Alhoewel die saadopbrengs in hierdie studie nie deurgaans betekenisvol tussen die nouer en wyer rye verskil het nie, was die opbrengs tog deurgaans hoër by die nouer rye.

Daar kan dus met redelike vertroue aanbeveel word dat sojabone waar moontlik in nouer (0.4 – 0.6 m) as wyer (0.8 – 1.0 m) rye aangeplant word. 'n Aspek wat egter ondersoek moet word, is die aanplant van sojabone teen verskillende digthede in die nouer teenoor wyer rye.

SUMMARY

Growth and development of soybean cultivars at different row spacings.

Several studies in especially the United States of America showed that soybeans produced higher yields when planted in narrow rows as opposed to wide rows. The higher yields were mostly attributed to better solar interception as a result of a higher leaf area index. A denser leaf canopy increases water use efficiency and decreases weed competition.

Therefore the influence of cultivars and row spacing on the growth and development of soybeans was evaluated. The experiments were conducted at two divergent localities, namely Bergville, Kwazulu-Natal and Bloemfontein, Free State during the 2000/01 and 2001/02 seasons with six cultivars (PAN660/564, Dumela, A5409, LS666, Tops and SNK500) and two row spacings (0.45 and 0.90 m). An effort was made to use or imitate commercial cultivation practices.

Several plant physiological components were measured, namely during the flowering stage: plant height, leaf mass, number of leaves, number of branches and leaf area index; and during physiological ripe stage: number of pods, pod mass and seed mass. During the flowering stage the nutrient concentrations in the above ground plant material was also determined. The water use efficiency over the growing season was also quantified.

Neither the cultivars nor the row spacing had a significant influence on nutrient concentrations in the above ground plant material. The water use efficiency, although not statistically analyzed, was higher at the narrow than wide rows.

Most of the above ground plant components that were measured had higher values at the 0.45 than 0.90 m rows. The one plant component that stood out in this regard was the number of branches that developed per unit surface area. When soybeans is planted at the same density in the 0.45 and 0.90 m rows the distance between adjacent plants in the

narrow rows (0.074 m) is twice of that in the wide (0.037 m) rows. The consequence thereof was that the soybeans developed significant more branches in the narrow than wide rows.

The more branches in the narrow rows resulted in a more bushy plant which broaden quicker. As a result of this together with the smaller distance between adjacent rows the soil surface was covered faster and therefor a higher leaf area index at the narrow than the wide rows. This higher leaf area index at the narrow than wide rows is in accordance with results reported by other researchers. They suggested the higher leaf area index resulted in earlier and higher solar interception. Although seed yields differed not always significantly between the narrow and wide rows, the yields were consistent higher at the narrow rows.

Soybeans should be therefore rather planted in narrow (0.4 – 0.6 m) than wide (0.8 – 1.0 m) rows if possible. An aspect that warrants investigation is the planting of soybeans at different densities in the narrow rows.