GROWTH ANALYSIS OF GROUNDNUTS (*Arachis hypogea*) IN COMPETITION WITH *Ageratum conyzoides*[1] /

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Resumen

Se diseñó un experimento con el fin de investigar el efecto de las hierbas sobre el crecimiento del maní en condiciones de invernadero. La competencia radical no tiene influencia significativa sobre el peso del forraje del maní, la competencia entre vástagos sí presenta un efecto significativo en su crecimiento. El efecto de competencia significativo de las hierbas sobre el maní fue observado luego de un período de desarrollo de 42 días. Se concluye que la competencia por la luz entre vástagos es la de mayor importancia cuando el maní está infestado con hierbas. Si se desea obtener un buen rendimiento en el cultivo del maní, las hierbas deben ser removidas antes del período crítico de los 42 días después de la emergencia

Introduction

There are two views with regard to the relative importance of light and soil nutrients in determining the outcome of competition. One view is that competition begins as soon as the root system of one plant invades a feeding area of another plant and usually takes place long before tops are developed sufficiently to exert serious competition for light (13). The second view is that light is the factor that determines the ultimate yield of a community of plants of a particular species (6). The purpose of the present work was to investigate the relative importance of competition for light and competition for soil nutrients in determining the competitive effects of the weeds (*Ageratum conyzoides*) on groundnuts.

Materials and methods

Seeds of a single population of the weed, *Ageratum conyzoides*, were collected from an abandoned farm near the University of Dar es Salaam. Groundnut seeds used in this experiment were obtained from Ukiriguru Agricultural Research Station, Mwanza, Tanzania and were described genetically as Bukene Strain of Natal Common (Ukiriguru Agricultural Research Institute Progress Report No. 2 of 1966). The seeds of *Ageratum conyzoides* and groundnuts were separately germinated between two layers of wet filter paper in Petri-dishes at 20°C and then transferred, after complete radicle development, to the conditions in which they were to grow subsequently.

The seedlings were planted in boxes (30 x 30 x 15 cm) each filled with a 50% mixture of river sand and loam soil. There was no fertilizer added and there was no inoculation with *Rhizobium*. Four plants of *Ageratum conyzoides* were grown in competition with one groundnut plant since in an earlier experiment it had been established that this combination grown in the soil mixture shown above resulted in the most significant reduction in the growth of groundnuts. The authors were interested in determining wheter root or shoot competition determined the overall growth of groundnuts. Therefore, the competition treatments were designed to eliminate different types of groundnut-weed competition. To eliminate competition in the soil environment, the box was partitioned with polythene sheets, while to eliminate competition in the aerial environment, opaque polythene sheet partitions were used. The aerial partitions were supported by wooden frames at the edges of the boxes to facilitate raising them as the canopy grew.

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There were four treatments and each treatment was replicated eight times. In the first treatment there was no competition; in the second treatment there was root competition; in the third treatment there was shoot competition; and in the fourth treatment there was full competition (shoot and root). For details of the experimental design see Donald (6).

The plants were grown in a green house, the boxes being arranged in a randomized block design. During the first 21 days of the experiment, each box was irrigated daily with one litre of distilled water on each side of the root system partition. After the initial 21 days when the plants had attained larger size, each box was irrigated with two litres of distilled water on each side of the root partition.

For each treatment there were four harvests at intervals of 21 days. At each harvest the length and breadth of individual leaves were measured and the roots, stems, leaves and seeds (obtained at the final harvest) were then oven dried at 80°C for 24 hours and weighed. The relative growth rate (RGR) was calculated using the formula of Fisher (8). The net assimilation rate (NAR) was calculated using the formula of Williams (16). The leaf area ratio (LAR) was calculated using the formula of Radford (14).

Results

The results are shown in Table 1 and 2 and Figures 1 to 4. Full and shoot competition caused a significant decrease in the forage dry weight of groundnuts when the competitive period exceeded 42 days (Table 1). Root competition had no significant effect on the forage dry weight of groundnuts. Full and shoot competition caused a significant decline in the assimilatory surface area of groundnuts when the

Table 1. **Production of dry matter (g/plant)* of groundnuts in function of competitive period and types of competition.**

Time of harvest (days after emergence)	Type of competition				Mean Square
	Full	Shoot	Root	None	
21	2.91 a	2.77 a	3.11 a	3.44 a	0.11
42	4.59 b	4.97 b	15.41 a	16.16 a	12.27
63	5.84 b	6.03 b	24.05 a	25.54 a	35.45
84	7.27 b	7.94 b	30.23 a	31.87 a	16.87

* Mean values for a harvest day followed by the same letter are not significantly different at the 5% level as determined by Duncan's multiple range test

Table 2. **Assimilatory surface area (cm^2)* of groundnut plants in function of competitive period and type of competition.**

Time of harvest (days after emergence)	Type of competition				Mean Square
	Full	Shoot	Root	None	
21	466.8 a	470.6 a	483.7	462.7 a	0.11
42	672.6 b	632.4 b	1754.7 a	1680.8 a	81.70
63	1725.7 b	1885.4 b	2996.5 a	3119.3 a	13.05
84	1899.4 b	1935.4 b	4391.0 a	4415.2 a	42.84

* Mean values for a harvest day followed by the same letter are not significantly different at the 5% level as determined by Duncan's multiple range test

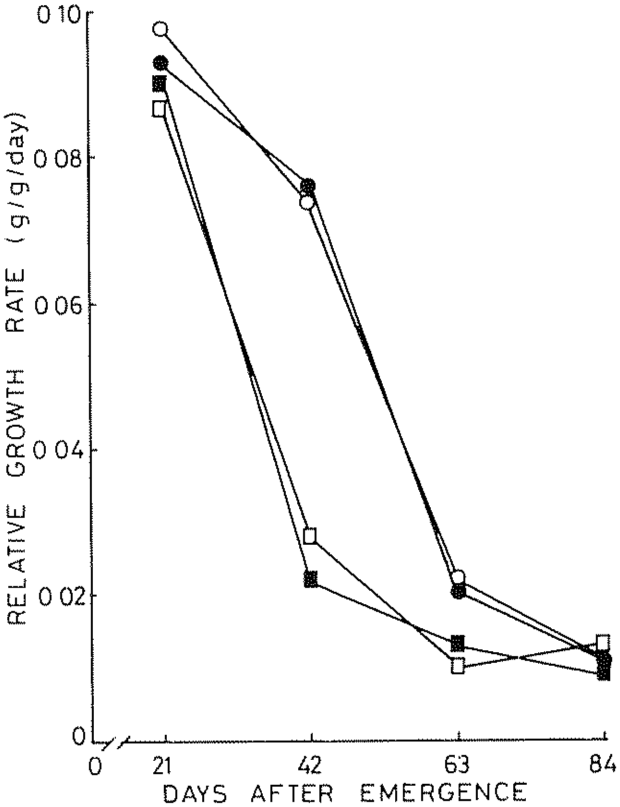

Fig 1. Mean relative growth rates of groundnuts subjected to root competiton (——●——), shoot competition (——□——), full competition (——■——) and no competition (——○——) with weeds.

duration of competition exceeded 42 days (Table 2). Root competition had no significant effect on the net assimilatory surface area of groundnuts.

Full and shoot competition caused a significant decrease in the RGR after a competitive period exceeding 42 days (Figure 1). NAR was not

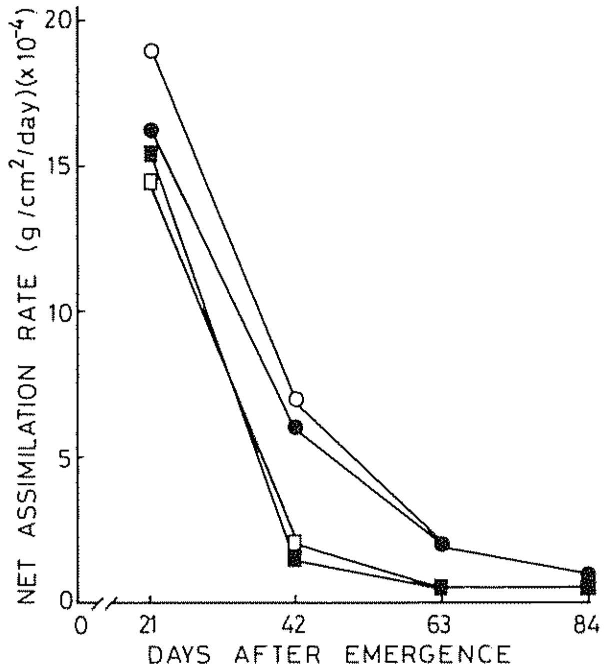

Fig 2. Mean net assimilation rates of groundnuts subjected to no competition (—○—), root competition (—●—), shoot competition (—□—) and full competition (—■—) with weeds.

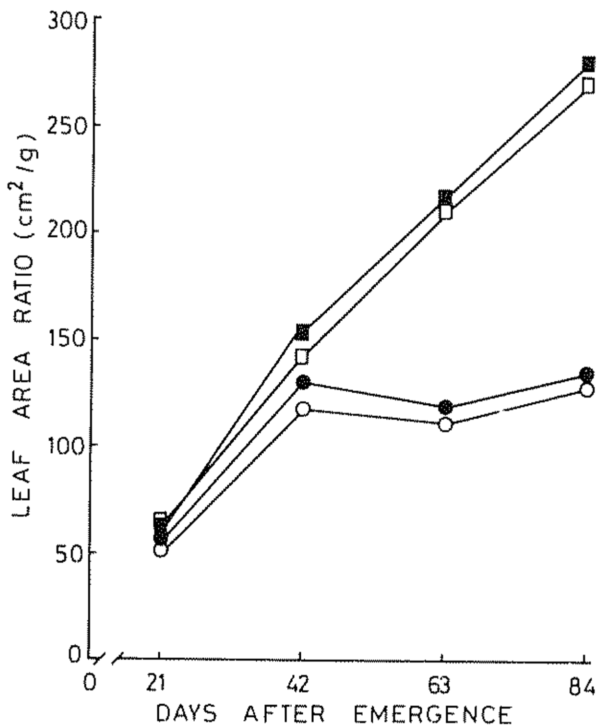

Fig. 3 Mean leaf area ratios of groundnuts subjected to no competition (—○—), root competition (—●—), shoot competition (—□—) and full competition (—■—) with weeds

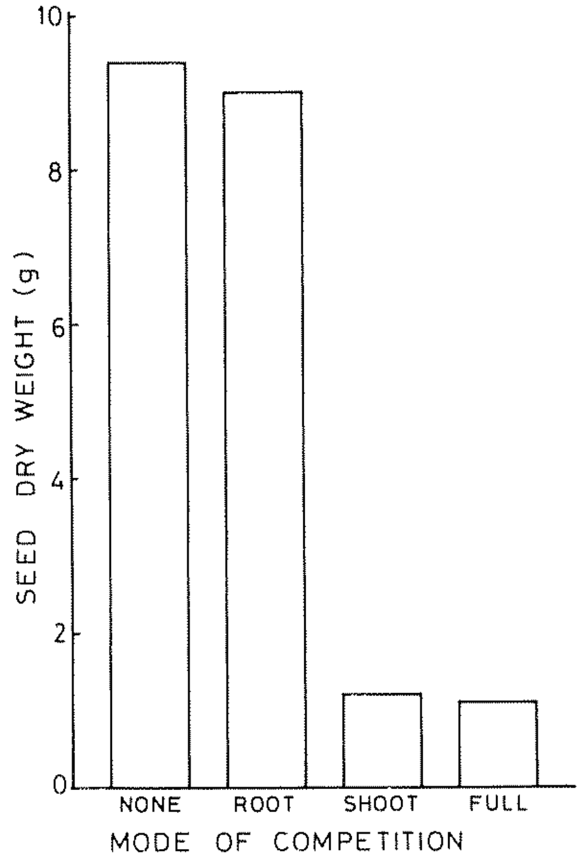

Fig 4 Seed dry weight of groundnuts subjected to none competition, root competition, shoot competition and full competition

significantly affected by competition (Figure 2). The LAR of groundnuts was significantly increased by full and shoot competition, the increment being more marked after a competitive period of 42 days (Figure 3). Figure 4 shows that the smallest dry weight of seeds per plant of groundnut was recorded for those plants which were exposed to full and shoot competition.

Discussion and conclusions

The results of this experiment show that competition for light between groundnuts and *A. conyzoides* was more important than competition for soil nutrients. Groundnut plants subjected to full and shoot competition with *A. conyzoides* showed the characteristic responses to shading (1, 5): the RGR and NAR were reduced while the LAR was increased. Shading experiments by Blackman and Black (2) and Huxley (12), and studies of seasonal changes of NAR (3, 11) have shown that a decrease in NAR is positively correlated with a decrease in the amount of light received by the plants Low RGR for plants grown in the shade has also been reported by many workers (e g 5, 7, 9, 10)

When a groundnut plant was subjected to root competition with *A conyzoides* a reduction in its supply of nutrients would be expected to lead to a decrease in the LAR (4, 5) and to have little or no effect on the NAR (15) It has been observed in this experiment that the NAR of groundnuts was not significantly affected when it was subjected to competition for soil nutrients with the weeds In fact, at all harvests, the LAR of groundnut plants subjected to root competition with the weed was slightly higher than the one which was grown free of competition (Figure 3) This shows that competition for soil nutrients was not significant

It may be worth noting that groundnut plants being legumes were able to avoid the competition for soil nutrients because they could utilize the nitrogen fixed by their root nodules In this manner it could compensate for any shortages of soil nitrogen caused by weed competition

Based on these results the following conclusions can be made: of the four modes of competition evaluated shoot competition for light is shown to be the most important when *A. conyzoides* interact with groundnuts The time at which the first groundnut growth reductions were observed was 42 days after emergence This indicate that the first 42 days of the competition between groundnut plants and weeds constituted the critical period of the crops growth cycle within which the weed exerted lasting competitive effects The critical period (42 days after emergence) corresponded with the time at which there was a rapid increase in the leaf weed density Weeding in groundnuts should therefore be done before 42 days after emergence

Summary

An experiment was designed to investigate the effect of weeds on the growth of groundnuts (peanuts) in the greenhouse Root competition had no significant effect on the forage dry weight of groundnuts Shoot competition had a significant effect on the growth of groundnuts Significant competitive effects of the weeds on the growth of groundnuts was observed after a competitive period of 42 days It is concluded that shoot competition for light is the most important when groundnuts are infested with weeds and if good yield is to be obtained, weeds should be removed from groundnut farms before the critical period of 42 days after emergence

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Reseña de libros

REAL ACADEMIA ESPAÑOLA Diccionario de la lengua española 20a ed Madrid: Espasa-Calpe. 1984 2 v

Al iniciarse el año 1985, ha aparecido en las librerías de América Latina una nueva edición, la vigésima, del "Diccionario de la lengua española" Tratándose de la guía oficial sobre los vocablos de nuestro idioma, es natural la curiosidad que ha despertado y la búsqueda en él de palabras nuevas En el prólogo la Academia anuncia que hay más de 20 mil vocablos nuevos, en buena parte términos científicos A esto se deben agregar nuevas acepciones, ampliaciones de significado o cambios en definiciones poco satisfactorias La Academia ha decidido que esta edición aparezca en dos volúmenes, en vez de dejar que el Diccionario crezca como el norteamericano Webster International

Un ejemplo de cambio de significado lo encontramos en **virus**. Su definición, hasta ahora, lo hacía casi un sinónimo de bacteria y se adoptaba el término **ultravirus** para identificar este tipo de ente, poniendo énfasis en su cualidad de filtrable En la nueva edición se pone un poco más al día el concepto de virus. diferenciándolo de las bacterias, aunque sin seguir a los científicos en sus recientes hipótesis sobre su naturaleza, según las cuales se les considera como nucleoproteídos que se propagan como entes vivos Pero, suponemos, comprender y describir esto sería quizás demasiado para los académicos de la lengua, en su mayor parte literatos y poetas Se añade el sustantivo **virosis** pero no se incluyen los correspondientes adjetivos, que como **vírico**, relativo a los virus, y **virótico**, relativo a las virosis, están usando los científicos Tampoco figura el adjetivo **viroso**, que Font Quer (Diccionario de Botánica, Labor, 1953) reserva para indicar un olor desagradable

El cambio de la definición puede también reflejar una ampliación de significado, al ser adaptado el vocablo a otras disciplinas Así, parámetro, que figuraba como término geométrico, sólo como nombre de una línea constante e invariable que entraba en la ecuación de una curva, aparece en 1984 como matemático, como una variable, que en una familia de elementos sirve para identificarla

Otras veces se presenta una nueva acepción del vocablo, sin que haya sustitución. Así, **esperanza** es aceptada en 1984 como la cuarta acepción, esta vez estadística, es decir una variable aleatoria como constante de una población Igualmente, **correlación** aparece en 1984 con una segunda acepción, estadística también, como dependencia mutua de variables aleatorias Un tercer ejemplo es **plasma**, que como término físico se está enseñando desde hace algún tiempo a los adolescentes como el cuarto estado de la materia, en el que los átomos se ionizan por agitación térmica, perdiéndose sus electrones, y que recién aparece en el Diccionario ahora como una cuarta acepción

Una ligera búsqueda de términos científicos nuevos revela que, si bien hay muchos recién acepta-dos, no son en realidad muy numerosos como para acortar el retraso que tiene la Academia con las palabras que usa la ciencia contemporánea. Es verdad que existen diccionarios especializados, algunos de los cuales reciben el consenso de los científicos y se convierten en verdaderas guías, pero lo que siempre se ha deseado es que esos vocablos sean incorporados oficialmente al idioma. En un tiempo se creyó que la Academia de la Lengua iba a valerse de la Academia de Ciencias Exactas, Físicas y Naturales de Madrid, para decidirse sobre los términos que iban apareciendo continuamente como resultado de los progresos de las ciencias. Esa labor la ha estado efectuando la Academia de Ciencias hace más de diez años, publicando fascículos en su **Revista,** los que parecen destinados a convertirse en sendos glosarios para cada ciencia, o quizás en un diccionario general científico. Esta esperanza no se ve realizada todavía, a pesar de la aceptación de algunos términos por la Real Academia.

Por ejemplo, en estadística hemos comparado términos sugeridos por la Academia de Ciencias con los del nuevo Diccionario. Ya hemos señalado que la Academia de la Lengua ha aceptado **esperanza, parámetro** y **correlación**. Pero no ha aceptado muchos otros como **regresión, covarianza** y **dispersión**. En biología, se han aceptado **alelo** y **genoma,** pero no **fosfolípido** y **axénico**. En física y química se han aceptado **holografía, láser** y **plasma,** pero no **cuásar, hidrazona** y **mesómero**. En el caso de **impedancia,** aceptado en 1970, ahora se agrega como principal, **impediencia**.

Existen otros ejemplos, en los que se incorpora al lenguaje un concepto, pero no se le acompaña con el adjetivo y verbo correspondientes. Y viceversa, tambien. Así, se incorpora **palatabilidad**, hasta hace poco un anglicismo aplicado a los pastos y alimentos para el ganado, pero no figura el adjetivo palatable, más necesario. Se acepta floculación, pero no flóculo. Esto parece que con el tiempo se corrige; así, se acepta el sustantivo **isóbara,** cuando desde 1970 se permitía el adjetivo **isobárica**. Uno se pregunta si, al ver aceptado **chequeo,** en el sentido de reconocimiento médico, cabe esperar que en la próxima edición podramos ver aparecer el verbo chequear.

En conclusión, el Diccionario de la Academia sigue siendo poco satisfactorio para el cientifico. La nomenclatura científica seguirá siendo aceptada y regulada por los propios especialistas, los que en muchos casos delegan autoridad a organismos internacionales, como para la nomenclatura química y para el Sistema Internacional de Medidas (SI).

Otro caso es el de las palabras de uso corriente, en las que la autoridad de la Academia es útil para evitar la contaminación del idioma, especialmente con barbarismos procedentes del inglés o francés. El proceso de incorporación es aquí justificadamente lento.

Como ejemplos podemos mencionar algunos. Influenciar es en esta edición aceptado y entra así al idioma como sinónimo de influir. Este verbo, considerado por mucho tiempo como anglicismo, fue defendido hace muchos años por Unamuno. Otra palabra útil es **concertación,** aceptada como acción de concertar. Es verdad que figuraba en su lugar **concierto,** pero este había adquirido una relación profunda con la música, que hacía incómodo su uso fuera de ese contexto. También hacen su aparición en el Diccionario **recauchar, recauchado** y **recauchutar**.

Quizás lo más importante para el usuario son las palabras, consideradas como incorrectas, que siguen sin aparecer. Esto quiere decir que esos vocablos deben evitarse al escribir y buscar sus equivalentes en el castellano, aún cuando uno los encuentra diariamente en los periódicos, la televisión y la radio, o, en el caso de científicos, uno los encuentra en sus lecturas en inglés y francés, en acepciones que no existen en español. Así siguen siendo incorrectas las siguientes:

– Asumir, anglicismo en el sentido de suponer;

– Escogencia, por selección o escogimiento;

– Abstracto, como resumen o compendio;

– Aplicación, como solicitud;

– Consistencia, como relación de una cosa con otra. Lo correcto es consecuencia, congruencia o coherencia;

– Directorio, como lista de abonados;

– Efectivo, como eficaz;

– Implementar, como poner en marcha;

– Nutriente, como nutrimento;

– Realizar, por comprender o darse cuenta;

– Reporte, como informe (sólo como noticia);

En conclusión, el Diccionario sigue siendo importante para el buen uso del lenguaje cotidiano, más no para el especializado, como el de las ciencias.

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