

A STUDY ON THE PHYSIOLOGICAL LIFE SPAN OF SUNFLOWER LEAF

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SUMMARY

The authors have studied the physiological life span of leaves in a confectionery sunflower variety 'Three Brows' and a corn hybrid 'Jing Hybrid Number' used as a check, with intention of establishing indicators for control of leaf growth and preventing a premature senescence of sunflower leaves.

In the sunflower variety, the 35th leaf was found to have the longest physiological life span of 58.4 days; the 44th leaf had the longest life span after flowering, 45.8 days. The average period of physiological activity of leaves after the stage of flowering was 29.0 days, i.e., 62.5% of the entire physiological lifetime.

The respective figures for the corn hybrid were: the 15th leaf - 94.9 days; the 20th leaf - 67.1 days; 53.2 days or 87.1%.

It is pointed out that grain yield could be further increased by prolonging the physiological life span of leaves after the stage of flowering which would promote the process of grain filling, increase grain weight and decrease the percentage of hulls.

INTRODUCTION

The growth, photosynthesis and grain yield of sunflower are directly affected by the physiological life span of the leaf. It happens often that a large number of sunflower leaves withers during the grain filling stage. Except for foliar diseases, it was not known whether the withering of leaves is related to the physiological life span of leaves. Observations of the physiological life span of sunflower leaves were conducted to establish indicators for controlling leaf growth and to prevent a premature withering of leaves in 1986.

MATERIALS AND METHODS

A confectionery variety of sunflower, "Three Brows", and a corn hybrid, "Jing Hybrid Number 6" (as a check), were used in this study. Experimental design was a randomized complete block with poly-replications for one location (Hebei Teacher's College of Agricultural Technology, Changli County, Hebei Province). Plot area was 30 square metres. Ten model plants were sampled for observation. Leaf emergence was recorded when the length of the leaf was 4 cm. Date of withering was recorded when a half of the leaf withered. Means of all data observed were computed as the experimental results.

Cultural practices such as soil preparation, fertilization, sowing, intertilling, irrigation and plant protection were the same as in commercial fields.

RESULTS AND ANALYSIS

Compared with corn, there were more leaves, a higher rate of leaf emergence, a shorter average physiological life span and fewer days alive after flowering for sunflower.

The average physiological life span of the two cotyledons of sunflower was 22.5 days. The physiological lifetime of sunflower leaves prolonged successively from the first piece. The 35th leaf had the longest physiological life span, 58.4 days. Life spans of the subsequent leaves, starting with the 36th, shortened gradually. Before the stage of flowering, the stage of flowering, eight leaves (including two cotyledons) withered. Days alive after flowering was 29.0 for all leaves, which was 62.5% of the total days of the entire physiological lifetime. After flowering, the 44th leaf had the longest life span, 45.8 days, from which, to the top and the base of the plant, the life span of the leaves was shortened gradually.

The leaf emergence of sunflower was one leaf every 1.2 days. The intervals between the emergence of two leaves were not significantly different except for the first, the second and the 8th pair of leaves. In corn, the physiological life span prolonged gradually from the first leaf. The 15th leaf (located at the level of the ear) had the longest life span, 94.9 days, from which the life spans of the subsequent leaves were shortened one after another. The first was the shortest, 21.0 days. Seven leaves withered before flowering (male flower). The average life span of the leaves after flowering was 53.2 days, which is 87.1% of the total days of physiological lifetime. After flowering, the 20th leaf was the longest to keep alive, which was 67.1 days; the two leaves above it and the ten leaves below it remained alive for a rather long time.

The average emergence rate in corn was one leaf every 2.7 days. The intervals between the two leaves emerging were not obviously changed, except for the 4th, the 5th and the 20th leaf.

DISCUSSION

It was indicated by the experimental results that the average physiological life span of sunflower leaves was relatively short especially after flowering. The photosynthetic efficiency could be promoted by prolonging the physiological life span of leaves after flowering. A more intensive transport of dry substances to reproductive organs could promote the process of grain filling, increase grain weight and decrease the percentage of hulls. Finally, grain yield will be further increased by strengthening the supply of water and fertilizers, protecting the leaves from premature senescence by prolonging their physiological life span and by promoting reproductive growth from the stage of budding to the stage of flowering.

REFERENCES

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ETUDE DE LA DURÉE DE VIE PHYSIOLOGIQUE DES FEUILLES DE TOURNESOL

RÉSUMÉ

Les auteurs ont étudié la durée de vie physiologique des feuilles d'un tournesol de consommation (variété "Three Brows") et d'un hybride de maïs ("Jing hybrid Number") utilisé comme contrôle, dans le but de déterminer des estimateurs de la croissance des feuilles et de prévenir la sénescence prématurée des feuilles de tournesol.

Pour la variété de tournesol étudiée, la trente cinquième feuille s'est révélée avoir la plus longue durée de vie physiologique avec 58,4 jours, la quarante quatrième feuille ayant la plus longue durée de vie physiologique après floraison avec 45,8 jours. La période moyenne d'activité physiologique des feuilles après floraison a été de 29,0 jours, c'est à dire 62,5% de la durée de vie physiologique totale.

Pour le maïs, ces données s'établissent comme suit: quinzième feuille: 94,9 jours; vingtième feuille: 67,1 jours; 53,2 jours soit 87,1%.

Nous soulignons que le rendement en grain pourrait être nettement augmenté en prolongeant la durée de vie des feuilles après la floraison ce qui pourrait favoriser le processus de remplissage des grains, augmenter le poids de mille grains et diminuer le pourcentage d'enveloppes.

UN ESTUDIO DEL PERIODO FISIOLÓGICO DE VIDA DE LA HOJA DE GIRASOL

RESUMEN

Los autores han estudiado el periodo de vida fisiológica de las hojas en una variedad de girasol blanco 'three brows' y un híbrido de maíz 'jing hybrid', usado como testigo, con intención de establecer indicadores para control de crecimiento de hoja y prevención de una senescencia prematura de las hojas de girasol, en la variedad de girasol, se encontró que la hoja 35 tuvo un periodo de vida fisiológica de 45.0 días. El periodo medio de actividad fisiológica de las hojas después del estado de floración fue 29.0 días, es decir, 62.5% del periodo de vida fisiológico completo. Las cifras respectivas para el híbrido de maíz fueron: La hoja 15, 94.9 días, hoja 20, 67.1 días, 53.2 días o 87.1%. Se puntualiza que el rendimiento en grano podría ser incrementado aún prolongando la vida fisiológica de las hojas después de la floración que aceleraría el proceso de llenado de grano peso y descenso del porcentaje de cáscara.