

Incident radiation on soybean leaves and pods.

Differential response of grain weight and composition.

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INTRODUCTION

Reproductive organs of soybean are green during most of grain filling period showing their capacity to utilize light. Grain composition would result from a complex combination of:

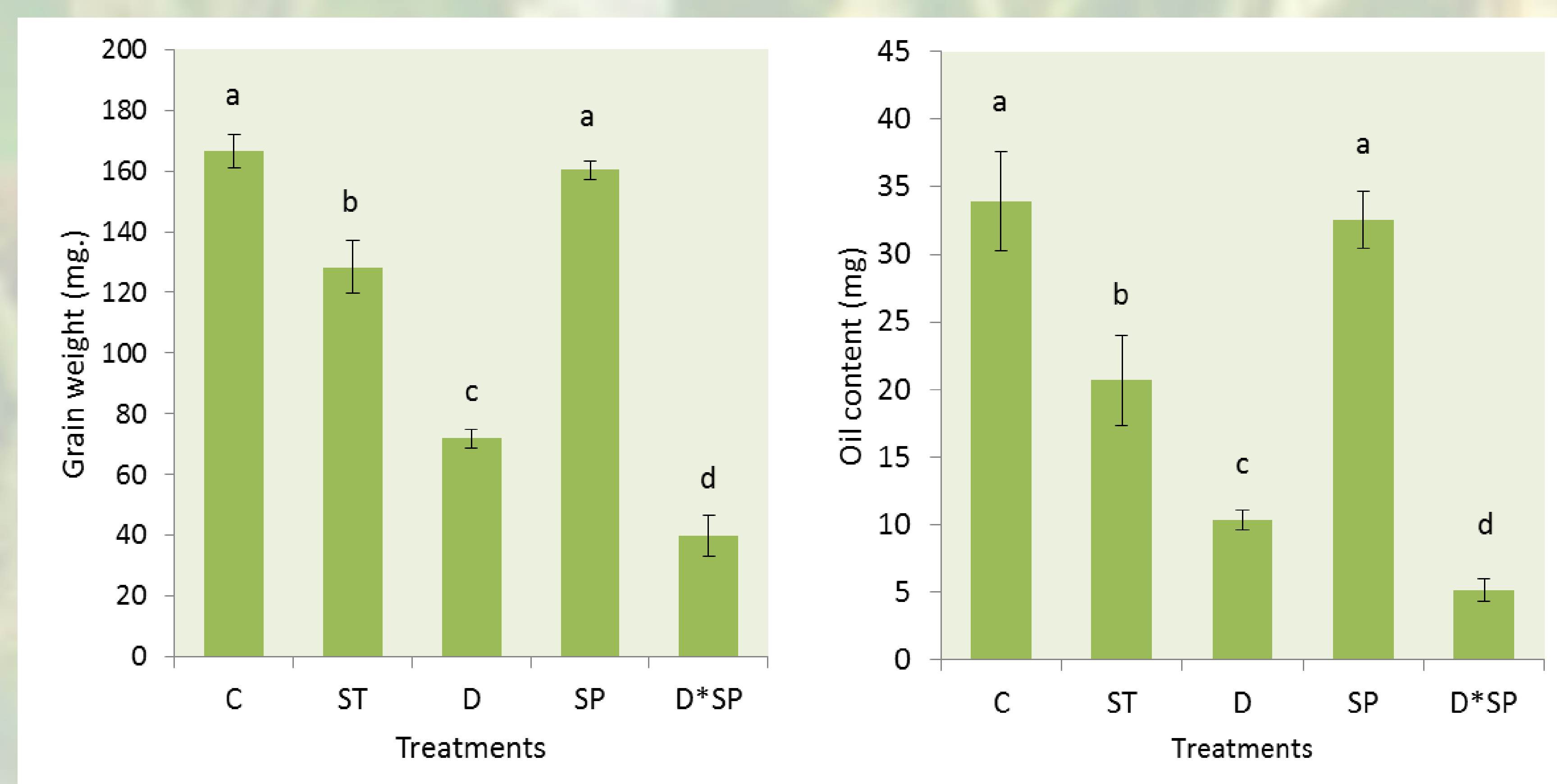
- the effects of light on leaves as main source of carbon
- local effects on pods, mainly by increasing oxygen production.

The objective of this work was to address how the radiation on the different structures of the plant (leaves and/or pods) affects grain weight and composition of soybean oil.

MATERIALS AND METHODS

Treatments were applied to modify radiation intercepted by: i) the whole plant (80% shading- S_T), ii) the leaves (total defoliation-D), iii) the pods (paper hood- S_p) and, iv) leaves and pods (defoliation + paper hood- $D*S_p$) during grain filling period (R5 to R8). Untreated soybean plants served as control (C).

Grain weight (GW), oil content (O) and fatty acid composition were determined.



Grain weight and oil content. Bars with different letters are significantly different ($p < 0.05$). Values are mean \pm standard deviation.

RESULTS

D , S_T and $D*S_p$ treatments reduced GW. These treatments also increased saturated (palmitic acid) and poly-unsaturated FA (linoleic and linolenic acids), while reduced oleic acid percentage.

S_p did not produce any effect on GW but significantly increased stearic acid and reduced linolenic acid.

When defoliation and pod shading were combined ($D*S_p$), GW was lower than, while FA composition was similar to values obtained under D treatment.

Treatment	Oleic Acid	Linoleic Acid	Linolenic Acid
C	19.93 \pm 0.96 a	54.75 \pm 0.84 b	8.99 \pm 0.20 c
S_T	17.73 \pm 0.08 b	55.04 \pm 0.52 ab	9.94 \pm 0.47 b
D	13.80 \pm 0.13 c	56.56 \pm 0.38 a	12.04 \pm 0.26 a
S_p	20.17 \pm 0.08 a	54.38 \pm 0.16 b	7.8 \pm 0.12 d
$D*S_p$	14.03 \pm 0.76 c	56.16 \pm 1.14 ab	11.95 \pm 0.63 a

Fatty acid composition (%). Different letters within a column indicate significant differences among treatments ($p < 0.05$). ^a Standard deviation.

CONCLUSION

The response of FA composition of soybean oil to solar radiation is mediated not only by the availability of C for oil synthesis but also depends on local effects on pods. Furthermore, when photoassimilates from leaves are scarce, pod photosynthesis contributes to C economy of the grains.