



بسم الله الرحمن الرحيم

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تم عمل المسح الضوئي لهذه الرسالة بواسطة / سامية زكى يوسف

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى

مسئولية عن محتوى هذه الرسالة.

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استجابة أصناف مختلفة من الأرز لنقص المياه

عند مراحل نمو محددة

رسالة مقدمه من

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بكالوريوس العلوم الزراعية (شعبة المحاصيل)

كلية الزراعة بكفر الشيخ - جامعة طنطا

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استيفاء الدراسات المقرره للحصول على

درجة الماجستير في العلوم الزراعية

(محاصيل)

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كلية الزراعة بكفر الشيخ

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(١٩٩٩)

TANTA UNIVERSITY
FACULTY OF AGRICULTURE
KAFR EL-SHEIKH
Department of Agronomy

**RESPONSE OF DIFFERENT RICE VARIETIES TO
WATER DEFICIT AT IDENTIFIED
GROWTH STAGES**

By
Wahieba Abd El-Kreem Zaghlool
B. Sc. Agric. Tanta University, 1994

Thesis
*Submitted in Partial fulfillment of
the requirements for the degree of*

**MASTER OF SCIENCE
IN
AGRONOMY**

Department of Agronomy
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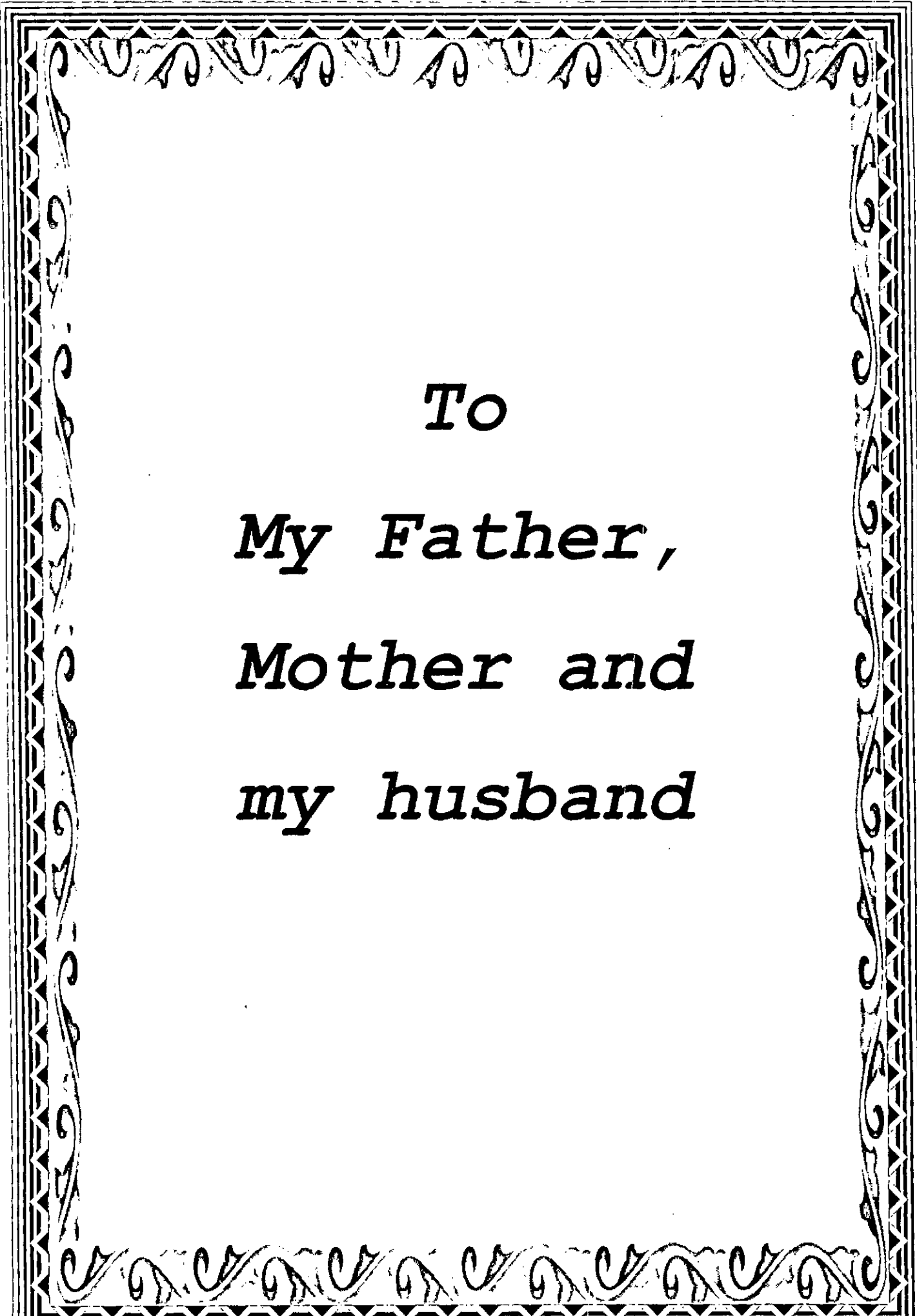
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To
My Father,
Mother and
my husband

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INTRODUCTION

INTRODUCTION

Water is one of the most important inputs required in agricultural production. The water requirement for plant growth is mainly met from soil water stored in the plant root zone. Rice is one of the most important agricultural food crops and is considered a semi-aquatic plant and thus could be grown under flooded or non-flooded conditions. Sometimes, the quantity of water required for one feddan of rice cultivation under flooding system may be sufficient to grow two to four feddan of other crop. In Egypt, about one million feddan (0.42 million ha) are yearly planted with rice, which are entirely flood irrigated. Rice shows significant genotype variation in physiological response to water deficit, which is known to retard phenological development and reduce growth of rice (Lilley and Fukai 1994 and Nour *et al.* 1994). The effect of water stress is widely believed to be more pronounced at some growth stages than others in many crops. Water deficit reduced rice yield much more, when it occurred during these critical stages of water requirements (Abd El-Malik 1981, O'Tool 1982, Kobata *et al.* 1994 and Sheoran and Saini 1996). In Egypt, it is planned to save more water for the expansion of agriculture in new areas and rice would suffer of reduction of its areas and/or suffer of less available flooding water, especially if Egyptian rice breeders could not breed and enable the release of short duration and less water consumptive (drought tolerant) new rice cultivars. Therefore, this investigation has been undertaken to study the effect of timing and duration of water stress on the growth, yield, yield components and yield quality of some rice varieties, and to determine the critical stage of each rice variety for water deficit.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

I- Effects of water stress on growth, yield and quality of rice crop :

Sharma and Rajat (1979) in India, used two systems of water managements i.e. continuous submergence and alternate wetting and drying to 0.15 – 0.20 atm tension. The results showed that grain yield was higher under continuous submergence as compared to other water stress treatments.

Abd El-Hafez (1982) in Egypt, investigated five irrigation treatments (5, 10, 15 cm water depth, saturation point and field capacity) on rice crop. He reported that plant height, total number of tillers per hill panicle length, number of spikelets per panicle and percentage of ripened grains per panicle were reduced when the soil moisture content was decreased to the field capacity.

Rezk et al. (1982) in Egypt, studied the response of two rice cultivars (Giza 181 and Giza 172) to three levels of flooded water i.e. 0, 5, 10 cm in the North Delta. They showed that number of panicles per hill, number of grains per panicle, 1000-grain weight, panicle weight and grain yield were reduced under zero levels of water compared to other flooded water treatments.

Hamissa et al. (1982) in Egypt, used three irrigation intervals i.e. irrigation every 4, 8 and 12 days. They found that the best water regime

was irrigation every 4 days, while irrigation every 12 days was significantly inferior to the other intervals.

Sah and Mikkelsen (1983) studied five irrigation treatments (continuous flooding and one or two cycles of alternate flooding saturated or flooding drained condition). They found that plant height and tillers number per hill were the highest under continuous flooding, while under alternate flooding-saturated treatments that two traits were slightly reduced. However, it both were drastically reduced under alternate flooding-drained.

Chaudry *et al.* (1984) in Turkey, used two irrigation intervals i.e. continuous flooding and flooding every 4th day. They found that percentage of sterility, 1000-grain weight and plant height were decreased with increasing irrigation intervals up to 4 days.

Mahrous *et al.* (1984) in Egypt, grew rice cultivar Giza 172 under three irrigation intervals i.e. 4, 6 and 8 days intervals. They found that plant height, 1000-grain weight and grain yield were decreased significantly by prolonging irrigation intervals up to 8 days.

Stone *et al.* (1984) in Brazil, used four irrigation levels i.e. corresponded to 55, 70, 85 and 100% of maximum evapotranspiration. The results showed that water stress reduced the number of filled grains per panicle, grain weight, grain yield, total dry matter yield and harvest index, while percentage of unfilled grains and growth duration increased with increasing water stress.

Westcott and Vines (1986), evaluated rice cultivars under flooding and sprinkler irrigation. They found that sprinkler irrigation decreased grain yield, dry matter production and harvest index compared to flooding treatment.

Mahrous and Aly (1986) in Egypt, reported that rice grain yield was not affected by the irrigation depths from 10 to 20 cm, However prolonging the irrigation intervals than 8 days significantly decreased grain yield.

Marimuthu and Kulandavielu (1987) in India, studied the effect of five irrigation treatments i.e. 1) continuous 5 cm submergence, 2) saturation to 5 cm submergence, 3) field capacity to 5 cm submergence, 4) a turn system of two 7 cm irrigations at 3 and 4 day intervals in one week, with no irrigation the alternate week, 5) continuous 5 cm submergence to 30 days after transplanting and there after no irrigation for 4 days, followed by one week continuous submergence on IR50 rice variety in Karif and summer. The results showed that in the Karif season relatively higher yield was obtained from continuous 5 cm submergence while the treatment of field capacity to 5 cm submergence gave relatively higher yield compared to other treatments in the summer season.

El-Bershamgy *et al.* (1988) in Egypt, found that the highest grain yield (3.58 t/fed) was recorded by irrigation every 4 days interval, while the lowest grain yield (3.33 T./fed) was obtained when rice plants were irrigated every 8 days interval.

Nour (1989) in Egypt, irrigated rice plant every 4, 8 and 12 days. The results showed that plant height, number of panicles per m² were decreased with increasing irrigation intervals from 4 to 12 days.

Abo-Soliman *et al.* (1990) in Egypt, studied three irrigation treatments i.e. irrigation every 4 days, at the field capacity and at the soil saturation. The results showed that irrigation every 4 days gave the highest grain yield (4.91 t/fed), while irrigation at field capacity gave the lowest ones (3.41 t/fed.).

Mc Cauley (1990), evaluated some rice cultivars under flooding and three levels of sprinkler irrigation. Irrigation treatments were 100, 50 and 25 replaced 100, 50 and 25% of estimated evapo transpiration (Ete) The results recorded that sprinkler irrigation reduced grain yield over 20% with treatment 100 compared to flooding irrigation and yield loss was due to reduced fertile spikelets. Also, milled grains were not affected by irrigation treatments.

Ingram *et al.* (1990) in Philippines, used two levels of irrigation i.e. continuously flooded and water deficit by withholding irrigation from 45 to 75 days after transplanting. They found that grain yield in the stress treatment was most strongly with visual assessment of drought stress symptoms.

Borrell (1991), found that grain yield of rice in tropical. Australia was not affected by intermittent irrigation to the three-leaf stage followed by permanent flood or flooding at sowing, while it was reduced to 5.4