J. Agric. Sci. Mansoura Univ., 29 (4): 1813 - 1822, 2004

EFFECT OF IRRIGATION TECHNIQUE ON INCIDENCE OF POD ROTS AND AFLATOXIGENIC FUNGI IN PEANUT

Mahmoud, E.Y.[1], A.A., Mosa[2], and M.M. Aly[2]
[1]Plant Pathology Res. Ins., Agric. Res. Center, Giza., Egypt
[2]Department of Plant Pathology, Faculty of Agriculture, Ain Shams University, Cairo, Egypt

ABSTRACT

Field studies were conducted in 2001 and 2002 to determine the effect of irrigation techniques, which included irrigation systems (furrow and sprinkle) and interval treatments (2, 4, and 6 days), which applied after three months from sowing, on the incidence of peanut pod rots (dry brown lesion, pink discoloration and general breakdown) and aflatoxigenic fungi (*Aspergillus flavus* and *A. parasiticus*). Generally, all categories of peanut pod rot incidence decreased with sprinkle irrigation system compared with furrow. Increasing the irrigation interval perform to decrease pod rot incidence as well as the moister percentage of peanut seeds. Pods having general breakdown were the most category affected on interval treatment following by dry brown lesion, while there were no significant effect on pods having pink discoloration. The occurrence of aflatoxigenic fungi on shells and seeds increased with increasing the irrigation interval in the two seasons. The content of aflatoxin in peanut pods was correlated with increasing the irrigation interval whether sprinkle or furrow system. Six-day interval with furrow system recorded the highest content of aflatoxin in the two seasons.

INTRODUCTION

Peanut, (*Arachis hypogaea* L.) is one of the most export and locally consumed crops in Egypt. Pod rots disease considered among the most destructive disease attacking peanuts and causing quantitative and qualitative losses of yield in Egypt (Hilal *et al.*, 1994). Meanwhile preharvest aflatoxin contamination is one of the most challengers facing the peanut producers (Payne, 1998). *Aspergillus flavus and A. parasiticus* were the predominant fungi infected peanut before harvest (Gangawane and Jadhav, 1982 and Reddy *et al.*, 1986).

Soil moisture and high relative humidity directly correlated with developed incidence and severity of peanut diseases (Bowen *et al.*, 1992 and Davis *et al.*, 1996). Pod rot (pod break down) is one of the important disease affected by level of irrigation in peanut (Porter *et al.*, 1987). Barnes *et al.*,(1990) found that, increasing of irrigation cause increased the diseases incidence by *R. solani*. While, Hassan and Fredrick (1995) stated that, one of the important reasons to decrease yield of peanut and increase disease incidence in United State is the extensive use of irrigation.

Drought stress especially during the last 4-6 wk of crop-development has been found the favor condition to invasion of pods and seeds by aflatoxigenic fungi (Mehan *et al.*, 1988 and Saleha, 1996). Most reporters of preharvest contamination of peanut with aflatoxin have been declared from

*This research is part of Ph.D. Thesis to be submitted by the first author to Ain Shams University.

areas where crops have been subjected to drought (Mehan *et al.*, 1986; Hassan and Frederick, 1995 and Rachaputi *et al.*, 2002).

The aim of this research is an attempt to study the relation between irrigation system and its interval and pod rot incidence, occurrence of aflatoxigenic fungi, aflatoxin contaminations and peanut yield.

MATERIAL AND METHODS

A-Field experiment:

The experiment was carried out under field conditions in both seasons 2001 and 2002, in a naturally infested field soil by pod rot microorganisms in Ismaillia Experimental Station of Agriculture Research Center (ARC). The soil type was sandy loam (77% sand, 11% silt and 12% clay; pH 7.98) Giza 5 cv peanut seeds sown on the first week of May. Experiment was arranged in a split-plot in a completely randomized block design (1/400 fed.; 3 X 3.5 m) supplemented irrigation system (furrow and sprinkle) was carried out in the main plots and irrigation interval treatments (2, 4, and 6 days) in the subplots. Plots were irrigated as required until intervals of irrigations were applied after three months from sowing. All treatments were replicated four times.

B-Diseases incidence:

At harvesting, percentage of pod rot was recorded. four categories for apparent symptoms of pod rots beside the healthy pods were adopted according to Satour *et al.*, (1978): a) *Rhizoctonia* rot, pods with dry brown lesion, b) *Fusarium* rot, pods with pink discoloration and c) complex rot pod with general breakdown resulting from many fungi.

C-Frequencies of aflatoxigenic fungi and identification:

Aflatoxigenic fungi, which associated with the four categories, were isolated after harvesting according to Garren and Porter (1970). Two seeds fruits were shelled and 1cm^2 pieces of shell and seed were surface-disinfested for three minutes in 1% sodium hypochlorite and plated on potato dextrose agar (PDA) medium (4 plates in 4 replicates, 5 seeds or shell pieces per dish). Plates were examined after 7 days incubation at 27 °C, for fungal structure

Identification of the isolates was carried out based on taxonomic criteria for these fungi as described by Maren and Johan (1988).

D-Determination of seed moisture and yield loss:

Samples of about 20 g seeds were prepared. Fresh weights were recorded directly after harvest, and then dried in an oven held at about 70°C for two days. The seeds were weighed after their removal from the oven and the percentage of moisture content was calculated using the following formulas:

Percentage of moister = ((weight fresh pod - weight of dry pod) / weight of fresh pod) X 100

Losses of yield were calculated using the following formulas:
Percentage of yield loss = (weight of rot pod) / weight of total pod) X 100.

E-Extraction of aflatoxin:

The extraction of aftatoxins was conducted according to A.O.A.C (1998). The samples were blended with 250ml methanol -water (55:45, v/v) and 100ml hexane for 1 min. at high speed. The mixture was transferred to the centrifuge tube and centrifuged for 5 min. at 2000 rpm. An aliquot from the aqueous methanol phase (25 ml) was taken into separator contained chloroform. The separator funnel was shaken (30-60 sec.); the bottom layer (chloroform) was separated and concentrated using rotary evaporator. The residue was quantitatively transferred using small volumes of chloroform. The solvent was completely removed under nitrogen flew.

F-Determination of aflatoxin:

Aflatoxins were determined according to Singh *et al.*, (1991) using thin layer chromatographic technique as follows; the dried film representing the aflatoxins in the samples was dissolved in a known amount of chloroform. The aflatoxin standards were spotted along with the samples. The plates were developed using a mixture of acetone-chloroform (1:9, v/v), the chromatoplates were detected under UV lamp at 365nm. The concentration of aflatoxin was calculated using the formula:

$$\mu g / Kg = (S.Y.V.)/ (X.W)$$

Where:
S= volume of aflatoxin standard, in µL of equivalent intensity of sample.
Y= concentration of aflatoxin standard in µg/ml.
V= volume of solvent required to dilution final extract in µL.
X= volume of sample extract in µL required to give fluorescence intensity comparable to that of S µL of standard.
W= weight of original sample in gram contained in the final extract.

G-Statistical analysis:

The data were statistically analyzed by analysis of variance (ANOVA) using the Statistical Analysis System (SAS Institute, inc, 1996). Means were separation by Duncan's Multiple Range Test at P = 0.05 level.

RESULTS

A-Effect of irrigation system on pod rot incidence, moister percentage, pod yield and yield loss:

Decreasing the interval of irrigation increased pod rots incidence in both two seasons 2002 and 2003 (Tables 1 and 2). At general sprinkle irrigation system has more reduced all categories of pod rot compared with furrow irrigation system. Pods have general breakdown were the most categories affected by decreasing the interval following by pods have dry brown lesion.

Interval of irrigation gave a significant effect on the percentage of peanut seed moister. Six-day interval recorded the lowest moister percentage in the both of irrigation system during two seasons. Percentage of peanut seed moister was high in furrow irrigation system compared with sprinkle irrigation system in all intervals.

Table (1): Effect of Irrigation system and its interval on percentage of pod rot incidence, moister percentage, pod yield and yield loss of Giza 5 cv. under field conditions during season 2001.

Irrigation system	Interval	Disease Incidence			Appar-ent healthy	% of moister [x]	Pod yield Ton/fed	%of yield loss [y]
		Dry brown lesion	Pink discoloration	General breakdown				
Sprinkle	2 days	13.46 a [z]	1.03 b	15.28 b	70.23 c	35.15 b	0.996 c	15.38
	4 days	8.34 b	1.32 ab	13.22 bc	77.12 b	29.00 bc	0.939 c	11.00
	6 days	7.54 c	1.51 ab	8.49 d	82.46 a	17.60 d	0.901 c	8.90
Furrow	2 days	13.45 a	1.19 b	17.23 a	68.13 c	48.00 a	0.876 d	17.87
	4 days	10.49 c	1.44 ab	13.51 bc	74.56 b	33.09 bc	1.025 bc	11.44
	6 days	8.41 c	2.25 a	11.51c	77.82 b	19.21 c	1.003 a	9.10

[x] Percentage of moister = ((weight fresh pod - weight of dry pod) / weight of fresh pod) X 100

[y] Percentage of yield loss = (weight of rot pod) / weight of total pod) X 100.

[z] Means in each column with the same letter are not significantly different according to Duncan's Multiple Range Test (P = 0.05).

Table (2): Effect of Irrigation system and its interval on percentage of pod rot incidence, moister percentage, pod yield and yield loss of Giza 5 cv. under field conditions during season 2002.

Irrigation system	Interval	Disease Incidence			Apparent healthy	% of moister [x]	Pod yield Ton/fed	%of yield loss [y]
		Dry brown lesion	Pink discolora-tion	General break-down				
Sprinkle	2 days	12.10 ab [z]	2.01 a	15.31 ab	70.57 bc	33.78 b	1.022 c	14.13
	4 days	9.45 cd	1.93 a	10.31 c	77.98 a	26.25 c	1.003 c	10.36
	6 days	8.03 d	2.00 a	6.77 d	83.20 a	17.77 d	0.979 e	7.14
Furrow	2 days	13.62 a	1.95 a	18.41 a	66.02 c	42.10 a	0.985 d	18.98
	4 days	12.00 ab	2.11 a	14.23 b	71.66 b	32.15 b	1.096 a	13.34
	6 days	11.31 bc	1.65 a	9.40 cd	77.64 a	18.65 d	1.052 b	8.70

[x] Percentage of moister = ((weight fresh pod - weight of dry pod) / weight of fresh pod) X 100

[y] Percentage of yield loss = (weight of rot pod) / weight of total pod) X 100.

[z] Means in each column with the same letter are not significantly different according to Duncan's Multiple Range Test (P = 0.05).

On the other hand decreasing the interval caused increase in pod yield in sprinkle irrigation which was not significant in season 2001. While in furrow irrigation increased the interval from 2 days to 4 days lead to significant increase of total pod yield. The loss of yield decreased with increase the interval of irrigation.

B-Effect of irrigation system on occurrence of aflatoxigenic fungi and aflatoxin content:

Results presented in Tables (3 and 4) indicate that, there was dominance in occurrence of *A. flavus* compared with *A. parasiticus* in all treatments whether shells or seeds and the frequency of aflatoxigenic fungi generally high in seeds compared with shells. The occurrence of aflatoxigenic fungi increased by increasing the interval of irrigation in both of irrigation systems sprinkle and furrow during two seasons 2001 and 2002.The frequency of aflatoxigenic fungi was high in furrow system especially with increased the interval.

In two seasons the content of aflatoxin in peanut pods increased by increasing the interval whether sprinkle or furrow system. Six-day interval with furrow system recorded the highest content of aflatoxin in two seasons.

DISCUSSION

The results of this study provide that, the irrigation system and their interval play an important role in pod rot diseases incidence. This is in agreement with Porter *et al.,* (1987), Barnes *et al.,* (1990), Hassan, and Fredrick (1995). This is due to the natural of peanut fruiting; pods as well known are produced in soil, where there is high microbial activity. Environmental extremes, either natural or induced by crop management practices often increase the incidence and severity of peanut diseases (Teo, 1983; Shew and Beute, 1984 and Han *et al.,* 1989). Environmental factors associated with irrigation, like reduced the peanut and soil temperature, have been related to the increase the incidence and severity of peanut pod rot (Sanders *et al.,* 1985 and Porter *et al.,* 1987). This may be due to the effects of microclimate, which associated with irrigation on the growth and spread of fungus (Smith *et al.,* 1988). Any of these factors alone or in combination might explain the increased of pod rot incidence in peanut after increased of rate of irrigation or decreased the interval period of irrigation.

These data also clearly showed that, decreased of irrigation by increasing the interval of irrigation performs to increase of aflatoxigenic fungi invasion and their ability to aflatoxin production. This is in agreement with Mehan *et al.,* (1988), Hassan and Frederick, (1995), Saleha, (1996) and Rachaputi *et al.,* (2002). Drought is usually associated with change in the microclimate (elevated pod-zone soil temperature and low soil moisture) and these make most of microorganisms fail to grow or grow weakly (Hill *et al.,* 1983). This condition make aflatoxigenic fungi became more aggressive (Horn *et al.,* 1994).

This due to drought stress may increase susceptibility to fungal invasion by decreasing the moisture content of the pod and seed or by greatly towering the physiological activity of the groundnut. The possible role of drought stress in preharvest aflatoxin contamination is to eliminate microbial competitors of aflatoxigenic fungi while elevating the soil temperature in the geocarposphere (Cole *et al.,* 1985 and Saleha, 1996). Moreover, *Aspergillus flavus* is more invasive than *A. parasiticus* and often dominated in peanut seeds because it is more aggressive than *A. parasiticus*. (Pitt *et al.,* 1991 and Horn *et al.,* 1994).

Table (3): E ffect o f I rrigation s ystem a nd i ts i nterval o n occurrence of *Aspergillus flavus, A. parasiticus* and aflatoxin content in peanut pods (shell and seed), on Giza 5 cv., under field conditions during season 2001.

Irrigation systems	Interval	Pod	Disease incidence						Apparent healthy		Content of aflatoxin (ppb)	
			Dry brown lesion		Pink discoloration		General breakdown					
			A. flavus	*A. parasiticus*	*A. flavus*	*A. parasiticus*	*A. flavus*	*A. parasiticus*	*A. flavus*	*A. parasiticus*	B 1	B 2
Sprinkle	2 days	Shell	10[2]	0	0	0	10	0	0	0	0	0
	4 days		0	0	0	0	5	0	0	0	0	0
	6 days		15	10	5	0	10	10	5	5	131	15
	2 days	Seed	10	5	0	0	5	0	15	5	0	0
	4 days		5	0	0	0	10	5	5	0	0	0
	6 days		15	10	5	0	20	10	15	10	252	28
Furrow	2 days	Shell	10	5	0	0	15	10	5	5	0	0
	4 days		10	0	0	0	10	5	5	0	0	0
	6 days		20	10	5	5	15	10	10	5	220	86
	2 days	Seed	20	10	0	0	15	10	10	5	0	0
	4 days		10	5	0	0	10	5	0	0	0	0
	6 days		25	15	10	5	20	15	15	10	1170	130

[2] Each value is mean of four replicates (4 plates / replicate, five seeds or shell pieces per dish) were incubated on PDA medium for 7 days at 27 °C.

Table (4): E ffect o f I rrigation s ystem a nd i ts i nterval o n occurrence of *Aspergillus flavus, A. parasiticus* and aflatoxin content in peanut pods (shell and seed), on Giza 5 cv., under field conditions during season 2002.

Irrigation systems	Interval	Pod	Disease incidence						Apparent healthy		Content of aflatoxin (ppb)	
			Dry brown lesion		Pink discoloration		General breakdown					
			A. flavus	*A. parasiticus*	*A. flavus*	*A. parasiticus*	*A. flavus*	*A. parasiticus*	*A. flavus*	*A. parasiticus*	B 1	B 2
Sprinkle	2 days	Shell	15 [1]	5	0	0	5	0	0	0	0	0
	4 days		10	0	0	0	0	0	0	0	0	0
	6 days		20	15	5	0	15	10	10	5	85	20
	2 days	Seed	15	10	5	0	15	10	0	0	0	0
	4 days		10	5	0	0	5	0	0	0	0	0
	6 days		25	10	10	0	20	15	15	10	321	141
Furrow	2 days	Shell	10	0	0	0	5	0	0	0	0	0
	4 days		15	10	0	0	0	0	0	0	0	0
	6 days		15	10	0	0	20	20	20	15	142	126
	2 days	Seed	20	10	10	0	15	10	0	0	340	123
	4 days		15	5	0	0	10	5	5	0	58	0
	6 days		25	15	10	0	25	15	15	10	1220	580

[1] Each value is mean of four replicates (4 plates / replicate, five seeds or shell pieces per dish) were incubated on PDA medium for 7 days at 27 °C.

REFERENCES

A.O.A.C. (1998). Official Method of Analysis of Official Analytical Chemists 16th ed. Kenneth Helrich edit. Published by the Association of Official Analytical Chemists Inc, Virginia, USA.

Barnes, J.S.; A.S. Csinos and J.E.Hook. (1990). Effects of fungicides, cultivars, irrigation and environmental on Rhizoctonia limb rot of peanut. Plant Disease.74: (9) 671-676.

Bowen, K.L.; A.K. Hagan and R. Weeks. (1992).Seven years of *Sclerotium rolfsii* in peanut fields: Yeild losses and means of minimization. Plant Disease. 76: 982-995.

Cole, R.J.; T.H. Sanders; R.A. Hill and P.U. Blanhenship (1985). Mean geocarposphere temperatures that induce preharvest aflaloxin contamination of peanut under drought stress. Mycopathologia 91: 41-46.

Davis, R.F.; F.D. Smith; T.B. Brenneman and H. McLean. (1996). Effect of irrigation on expression of stem rot of peanut and comparison of aboveground disease ratings. Plant Disease. 80: 1155-1159.

Gangawane, L.V. and K.G. Jadhav. (1982). Pollutant molds on the preharvest groundnut kernels in Marathwada. Indian Botany Reporter, 1 (2): 156-157.

Garren, K.H. and D.M. Porter (1970). Quiescent endocarp floral communities in cured mature peanuts from Virginia and Puerto Rico. Phytopathology. 60: 1635-1638.

Han, M.J.; S.K. Kim; J.S. Yang and S.B. Park. (1989). Studies on the pathogenic fungi and incidence of pod rot 1: pathogenic fungi associated with pod rot. Crop Production, 31 (2): 1-3.

Hassan, A.M. and M.S. Frederick. (1995). Peanut Health Management. APS Press. the American Phytopathological Society.

Hilal, A.A.; A.H Metwally; S.A. Khaled, and A.A. El-Deeb (1994). Evaluatuion of peanut cultivars, date of sowing and NPK as integrated control measurement against soilborne diseases. Zagazig Journal Agriculture Research, vol. 21 (4): 1151-1162.

Hill, R.A.; P.D. Blankenship; R.J. Cole and T.H. Sanders. (1983). Effect of soil moisture and temperature on preharvest invasion of *Aspergillus flavus* group and subsequent of aflatoxin development. Applied Environmental Microbiology (45): 628-638.

Horn, B.W.; J.W. Dorner; R.L. Green; P.U. Blanhenship and R.J Cole. (1994). Effect of *Aspergillus parasiticus* soil inoculums on invasion of peanut seeds. Mycopathologia 125: (3) 179-191.

Maren, A.K. and I.P. Johan. (1988). A laboratory guide to the common Aspergillus species and their teleomorph. Commonwealth Scientific and Industrial Res. Org. Division of Food Processing. 116pp.

Mehan, V.K.; D. McDonald; N. Ramakishna and J.H. Williams. (1986). Effects of genotypes and date of harvest on infection of peanut seed by *Aspergillus flavus* and subsequent contamination with aflatoxin. Peanut Science. 13: 46-50.

Mehan, V.K.; R.C. Rao; D. McDonald and J.H. Williams. (1988). Management of drought stress to improve field screening of peanuts for resistance to *Aspergillus flavus*. Phytopathology. 78: 659-663.

Payne, G. (1998). Process of contamination by aflatoxin production fungi and their impacts on crops. In Mycotoxins in Agricalture and Food Safety, ed. K Sinha, D Bhatnagar. New. York: Marcel Dekker.

Pitt, J.I.; S.K. Dyer and S. McCommon. (1991). Systemic invasion of developing peanut plant by *Aspergillus flavus*. Lettersin Applied Microbiology 13: (1) 16-20.

Porter, D.M.; F.S. Wright and N.L. Powell. (1987). Effects of sprinkle irrigation on peanut diseases in Virginia. Plant Disease. 71: 512-515

Rachaputi N.R.; G.C. Wright and S. Krosch. (2002). Management practices to minimise pre-harvest aflatoxin contamination in Australian groundnuts. Australian Journal of Experimental Agricalture 42: (5) 595-605.

Reddy, P.S.; C.V. Reddy; V.R. Reddy and P.V. Rao. (1986). Incidence of fungal infestation in some feed ingredients in three geographical regions of Andhra Pradsh (India). Indian Journal of Animal Science, 56 (7): 789-792.

Saleha, N. (1996). Drought stress and preharvest seed invasion of selected groundnut genotype by *Aspergillus flavus* and aflatoxin contamination. Indian Phytopathology. 49:52-56.

Sanders, T.H.; R.J. Cole; P.D. Blankenship and R.A. Hill. (1985). Relation of environmental stress duration to *Aspergillus flavus* invasion and aflatoxin production in preharves peanuts. Peanut Science. 12: 90-93.

SaS Institute, Inc. (1996). SAS/STAT Users Guide, Version 6, 12 st Ed. Volume 2, 846 pp. SaS Institute, Inc. Cary, North Carolina.

Satour, M.M.; M.A. Abd-El-Sattar; A.A. El-Wakil; E.A. El-Akkad and L.A. El-Ghareeb. (1978). Fungi associated with stem and pod rot diseases of peanut in Egypt. 10th Annual Meeting of American Peanut Res. Educ. Assoc. (APREA), Gainesville, Florida (Abstr.).

Singh, K.; J.C. Frisvard; U. Thrane and S.B. Mathur. (1991). An illustrated manual on identification of some seedborne *Aspergilli, Fusaria, Penicillia* and their mycotoxins. Danish Gover. Inst. Of seed pathology for Developing Countries, Copenhagen, Denmark.

Shew, B.B. and M.K. Beute (1984).Effects of crop management on the epidemiology of southern stem rot of peanut. Phytopathology. 74: 530-535.

Smith, V.L.; C.L. Compbell; S.F. Jenkins and D.M. Benson. (1988). Effects of host density and number of disease foci on epidemics of southern blight of processing carrot. Phytopathology. 78: 595-600.

Teo, B.K. (1983). The influence of soil moisture on the development of Sclerotinia blight of peanut. Ph.D. Dissertation Virginia Polytechnic Inst. and State Uni. Blacksburg. 125pp.

تأثير تقنيات الري على تواجد أعفان الثمار و الفطريات المفرزة للأفلاتوكسين في الفول السوداني.

عماد الدين يوسف محمود محمد[1]- عبد الرحمن عبد اللطيف الديب[1]- أحمد أحمد موسى[2]- مديح محمد علي[2]

[1]معهد بحوث أمراض النبات- مركز البحوث الزراعية- الجيزة.

[2]قسم أمراض النبات- كلية الزراعة- جامعة عين شمس- القاهرة.

أجريت هذة الدراسة الحقلية خلال موسمي ٢٠٠١ و ٢٠٠٢ بمحطة بحوث الاسماعلية لتقدير مدي تأثير تقنيات الري التي تشمل اثنان من نظم الري(الغمر و الرش)وكذلك فتراتة (٦، ٤، ٢ يوم) التي تم تطبيقها بعد ثلاثة أشهر من الزراعة، علي أعفان ثمار الفول السوداني(عفن بنى، عفن وردى و أعفان أخرى تتمثل في مظهر الإنهيار التام للثمار) ومدى تواجد الفطريات المفرزة للأفلاتوكسين(*Aspergillus flavus*, و *A. parasiticus*). أوضحت النتائج إنخفاض كل درجات أعفان الثمار في نظام الري بالرش بالمقارنة بنظام الري بالغمر. أدت زيادة فترات الري إلي تقليل نسبة الإصابة بأعفان الثمار وكذلك نسبة رطوبة بذور الفول السوداني.الثمار المصابة بمظهر الانهيار التام كانت أكثر درجات الأعفان تأثرا بفترات الرى تلاها الثمار المصابة بالعفن البني بينما لم يوجد أي تأثير معنوي علي الثمار المصابة بالعفن الوردي.

نسبة تواجد الفطريات المفرزة للأفلاتوكسين زادت بزيادة فترات الري بنظامية الغمر والرش في كلا الموسمين وكذلك زاد محتوى ثمار الفول السوداني من الأفلاتوكسين أيضاً. أعلى تلوث للثمار بالأفلاتوكسين كان في نظام الري بالغمر مع إجراء الري كل ستة أيام بداية من الشهر الرابع من الزراعة.