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Influence Of Weeds And Environmental Factors On The Quality Of Rice Grain

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Abstract:Rice holds a vital position as a major economic crop in India. Among its attributes, grain quality is of prime importance since it directly impacts consumer acceptance in local as well as global markets. The performance of various grain quality traits depends heavily on environmental influences and cultivation practices.In the present study, data from ten experimental fields located in Bhor and Velhe talukas of Pune district were collected and analyzed. The findings revealed that ash values are notably affected by both environmental conditions and weeding practices of the respective fields.Overall, the results confirm that environmental factors and weed management practices play a vital role in determining rice grain quality and productivity. These insights can contribute to the development of improved cultivation practices aimed at enhancing both crop quality and yield.

Index Terms: Grain Quality, Weeds, Rice field, Ash value,Acid insoluble.

I.INTRODUCTION

Rice (Oryza sativa L.) production is an important part of the national economy.India is one of the world's largest producers of rice, accounting for 20% of all world rice production. Moreover, the country has biggest area under rice cultivation, as it is one of the principal food crops. Maharashtra is one of the major states in rice production; totally it represented 1.48 M ha. land under rice cultivation which is 3.4% of total area of India and gives 2.47 M.t of productivity.(1)Demand for rice is growing every year and it is estimated that in 2010 and 2025 AD the requirement would be 100 and 140 million tones respectively. To sustain present food self-sufficiency and to meet future food requirements, India has to increase its rice productivity by 3 percent per annum. (2) By considering increase demand the productivity and maintained quality of economically impotent crop of rice in India led the researchers to develop different cultivars and cultivation practices. The performance of many quality characteristics depends greatly on environmental conditions, practices and weeds associated with it which alters the physicochemical properties of rice(3,4)

Ash value/content is directly associations with environmental conditions and is of great interest in defining optimal values of grain quality for a particular region. (5, 6) The perusal of literature shows very few studies have taken into consideration the effects of cultural practices on weed distribution and rice yields. Therefore, weed management strategies were chosen taking into account all the factors affecting weedy rice populations in order to reduce the impacts of the weed to an economically acceptable level.

In present study, Different five locality of Bhor and Velhe taluka from Pune, Maharashtra were selected. The main objective of study was calculating effect of different environmental conditions and different weed management practices on quality and productivity of rice.

II.MATERIALS AND METHODS

Study area: Bhor and Velhe taluka of Pune district comes under the western ghats of Maharashtra known as Sahyadri lies between 72° 60' to 74° 40' E and 15° 60' to 20° 75' N covering an area of about 52,000 sq. km starting from sea level.For Bhor taluka cultivation fields from five localities were selected for experiment namely Karanje, Kiwat, Nigudghar , Karnawad, Salekarvasti. The same way in Velhe taluka Sangvi, Gunjavane, Amba, Pabe, Wanjale were selected.The experimental fields were selected on the basis of previous observation of the weeds in rice cultivation. At the initial stage of the study, weed surveys were performed to record the severity of weed in based on visual scoring, to determine the sampling plots. Five rice fields from selected villages from each taluka were selected on the basis of the severity of weed. Selected field is divided in two parts 1) Control and 2) Sampling field (Uncontrolled fields).

In control field, weeds were removed and maintained throughout the experiment while uncontrolled fields were allowed to grow naturally. After pre-decided intervals, the number of weeds in rice fields were recorded using 1 x1 m quadrats, before crop harvesting about 125 to 130 days after sowing, from 50 randomly selected sampling spots in each plot (about 1 ha). In both control and sampling fields, grains were harvested from predetermined quadrates. Rice yield and yield components for example, number of panicles/m^2, number of spikelet/panicle, percentage of ripened grains and 1000-grain weight, were also recorded.

Ash analysis: The collected grain samples from control and uncontrolled were further processed for ash values viz. total ash, acid-insoluble ash and water-soluble ash value, were determined as per the WHO guidelines (1998).

i) Determination of total ash values: 2 g air-dried powder of plant samples were taken in pre-weighed silica crucibles.These crucibles along with powder were heated slowly up to 450°C in muffle furnace for 4 h to obtain carbon free ash.Then ash was cooled and weighed. This procedure was repeated till constant weight was recorded. The percentage of total ash (carbon free) was calculated with reference to weight of air-dried powder.

ii) Determination of acid-insoluble ash values: Carbon-free ash, obtained by above procedure was boiled in the crucible with 25 ml of 0.1N HCL for 5 min. The ash was then filtered through ash-less filter paper (Qualigens, Filter paper no. 41) and the insoluble matter was collected on it.The collected ash was washed with hot water. The crucible with ash-less filter paper and insoluble residue was kept in furnace at 450°C for 4 h. It was then cooled, weighed and the percentage of acidAbsolute ash was calculated with reference to the air dried powder.

iii) Determination of water-soluble ash values: The obtained total ash was boiled for 5 min with 25 ml of distilled water.The insoluble matter was collected on the ash less filter paper (Qualigens, Filter paper no. 41), washed with hot water and kept in furnace at 450°C for 4 hrs. The weight of the insoluble matter was subtracted from the total weight of ash.The difference in the weight represented the water-soluble ash value. The total ash value, acid-insoluble ash value and water soluble ash value for each control and uncontrolled grain samples were determined by above described procedures. The mean of six readings and standard deviation was calculated.

Tables

3.1.Cumulative ash value of five experimental fields of Bhor.

Taluka-Bhor

1)Salekarvasti	**Salekarvasti(Uncontrol)** Water soluble - 5.495864 Acid insoluble - 5.336066 **Salekarvasti(Control)** Water soluble - 5.521527 Acid insoluble - 5.262843
2)Nigudghar	**Nigudghar (Uncontrol)** Water soluble - 5.176281 Acid insoluble - 1.609225 **Nigudghar (Control)** Water soluble - 5.681886 Acid insoluble - 5.398633
3)Karanje	**Karanje (Uncontrol)** Water soluble - 5.203504 Acid insoluble - 4.587882 **Karanje (Control)** Water soluble - 5.336785 Acid insoluble - 4.565857
4) Karnawad	**Karnawad (Uncontrol)** Water soluble - 5.258964 Acid insoluble - 4.629604 **Karnawad (Control)** Water soluble - 5.480015 Acid insoluble - 4.633019

Taluka-Bhor

5) Kiwat	**Kiwat (Uncontrol)** Water soluble - 5.856252 Acid insoluble - 5.817011 **Kiwat (Control)** Water soluble - 7.194456 Acid insoluble - 5.53299

3.2. Cumulative ash value of five experimental fields of Velha

Taluka-Velha

1) Ambawane	**Ambawane (Uncontrol)** Water soluble - 5.637111 Acid insoluble - 5.052782 **Ambawane (Control)** Water soluble - 5.630631 Acid insoluble - 5.079258
2) Pabe	**Pabe (Uncontrol)** Water soluble - 6.384042 Acid insoluble - 5.384683 **Pabe (Control)** Water soluble - 6.568078 Acid insoluble - 6.174611
3) Wanjale	**Wanjale (Uncontrol)** Water soluble - 4.056264 Acid insoluble - 5.069607 **Wanjale (Control)** Water soluble - 4.056264 Acid insoluble - 5.069607

Taluka-Velha

4) Gunjavani	**Gunjavani (Uncontrol)** Water soluble - 5.27055 Acid insoluble - 4.776288 **Gunjavani (Control)** Water soluble - 5.244458 Acid insoluble - 4.774826
5) Sangvi	**Sangvi (Uncontrol)** Water soluble - 5.575253 Acid insoluble - 5.478504 **Sangvi (Control)** Water soluble - 5.200992 Acid insoluble - 5.102041

IV.RESULTS

4.1 Productivity of grains and yield components

Yields recorded in the studied control and uncontrolled farms showed the significant variation.In Bhor Karnawad locality show highest production as compared to rest locality. In Velhe Gunjavani locality show highest production as compared to rest locality.

4.2 Ash value

The comparative ash analysis shows that as the variation in environment and weeding practices show positive correlation with ash value. In Bhor, Kiwat show highest ash value as compared to different locality listed in Table 3.1.In Velhe, Pabe show highest ash value s compared to different locality listed in Table 3.2.

V.Discussion

Quality parameters like ash values appear to be influenced, to a certain extent, by environmental conditions and weeding practices. Consequently, this data is helpful to breeders and producers to take in to account these climatic variables during grain filling in order to identify the best genotypes with acceptable technological quality and productivity.

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