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Effect Of Soaking And Drying On Recovery Of Dhal (*Lathyrus Sativus* Variety Mahateora)

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ABSTRACT

Pulses are the most prominent and economic source of vegetative protein and cheap source of body - building protein as well. The *Lathyrus sativus* are one of the most commonly using pulses all over the world. India is the largest producer and consumer of pulses in the world. Also, India is the most significant exporter of pulses and that contributes to strengthen the economy status of the farmer's as well national economy in direct and indirect way. The *dhal* recovery percentage obtained after second passing of the *Lathyrus* seeds. The water soaking treatment in the different hours 2, 4, 6, 8, 10 and 12 hours in which the maximum *dhal* recovery was found to be 75.76 percent in the 8 hour water soaking treatment. The analysis of variance (ANOVA) shows the significant result of *dhal* recovery. The critical difference was found to be 2.865, which means the treatment will be change the quality of *dhal*.

Key word: - *Lathyrus sativus*, Analysis of Variance (ANOVA), Critical Difference (CD), Dhal Recovery, Soaking Treatment

INTRODUCTION

In India, the major *Lathyrus* cultivating state are Chhattisgarh, Bihar, Jharkhand, Maharashtra, Odisha, Assam, West Bengal, and Eastern Uttar Pradesh. It is grown as a relay crop and it is one of the best options for extra income from rice fields with minimal cost. In Chhattisgarh *Lathyrus* is cultivated mostly in districts *viz.* Raipur, Durg, Ranjandgaon, Kabirdham, Bilaspur, Dhamtari, Raigarh, Mahasamund, Janjgir-Champa, and Jashpur and consumed in the form of *dhal*. Nutritionally, the *Lathyrus* is an important because of its content protein 26.3-34.3%, ash 2.6-3.9%, fat 5.3%, crude fibre 10%, lignin 0.8-1.5% and starch 41.2% (Ramezani *et al*. 2016). *Lathyrus sativus* is much-branched, herbaceous annual crop with a welldeveloped taproot system. Its fruit is typical having oblong pods, slightly flatten and bulged forming over the seed. The average length of fruit is nearly 2.5-5 cm, width 0.6-1.0 cm and slightly curved. The pod is dorsally part with 2-winged. In India the

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Lathyrus sativus is known as lakhori, Teora and Khesari. It is also popularly known as grass pea, chickling pea and chickling vetch in other parts of the world like Ethiopia. On an estimate the global area under this crop is reported to be1.50 million ha, with the annual production of 1.20 million tonnes, of which 0.92 million ha is the contribution from in the South Asia. About 0.63 million ha is covered under this crop is in Sub-Saharan Africa (Lambein *et al*. 2019). It is grown mainly for human consumption as well as for animal feed purposes in India. However, Lathyrus is grown in many other countries of the world such as West Asia, North Africa, Nepal, Bangladesh, Ethiopia and Pakistan for human consumption, fodder and also for the use as green manure (Sammour, 2014). The *Lathyrus* seed is a higher source of protein as compared to many other pulses (Ramezani *et al*. 2016).The pre-milling treatment plays an important role for better recovery of *dhal* (Marumkar *et al*. 2016). The various pre-milling treatment are applying to loosen the husk from the cotyledon. The various pre-treatment such as application of water, oil, chemical and heat treatment helps to loosen the outer seed husk. The *Lathyrus sativus* are one of the most commonly using pulses all over the world. *Lathyrus sativus* belongs to the *Fabaceae* family. Usually, pulses are consumed in the form of the *dhal*. *Dhal* are the de-husked and splitted form of the any pulse kernel. Pulses are de-husked and broken into two parts to make it consumable as split *dhal*. All the Pulses are rich source of proteins, fat, carbohydrates and several minerals. Also, pulses have low glycemic index and high fiber content (Ramezani *et al*. 2016). The Indian Institute of Pulses Research (IIPR, Kanpur) has developed an effective *dhal* mill named “IIPR mini *dhal* mill”. The IIPR *dhal* mill gives good quality of *dhal* and has less maintenance cost and also available in reasonable price (Goyal *et al.* 2005).

Material and methods

Source of Material

Lathyrus seeds were procured from the local market of Raipur Chhattisgarh. Lathyrus Seeds were stored in the gunny bag until used. The pulses stored above 12% moisture content.

Pre- milling treatment

The treatment is given for loosening of husk from cotyledons, which is attached through a gum layer is called pre-milling treatment. Usually, water soaking, oil and water application, mixing of sodium bi-carbonate solution and thermal applications are recommended and adopted for pre-milling treatments. The pre-treatment is important for *dhal* recovery.

Experimental milling plan

The experimental milling plan is important for ease in understanding the milling treatment process. The step by step process flow chart is as described below:

Raw *Lathyrus* seeds

↓

Cleaning and grading

↓

(Chaff, dust)

↓

Soaking

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(Different level 2 h, 4 h, 6 h, 8 h, 10 h, 12 h)

↓

Drying (Sun drying)

↓

Milling
(Splitting of husk, broken, powder)

↓

Collection of seeds

↓

Packaging

↓

Storage

Fig 1 - Process flow-chart for milling of *Lathyrus* seeds involving water soaking

Water soaking treatment

Soaking

Soaking in water is the first step in most methods of preparing pulses for consumption. Soaking also reduces the amount of phytic acid in pulses. The soaking treatment improved the milling quality of pulses. Three kilogram of Lathyrus seeds were taken in a container and fill of tape water. Soaking of Lathyrus seeds were allowed for different period of time viz. 2, 4, 6, 8, 10, 12 hours. (Mohite, 2014).

Fig.2 Water soaking treatment of *Lathyrus* seeds

Sun drying

In order to remove the moisture content up to 8 to 10 percent (dry basis) water soaked Lathyrus seeds were taken out and allows for sun drying for 7 to 8 hours per day continuous for 2 to 3 days.

Milling of Lathyrus seeds

The IIPR mini dhal mill (model - Indian Institute of pulse Research Dhal Chakki and type is Rubber- steel disc). The IIPR mini dhal mill basically consists of three major unit viz. feeding unit, one cleaning unit and milling unit. During milling the husk, broken, dhal and powder were separated automatically by IIPR mini dhal mill during first passing after that un-dehulled dhal and seeds gota obtained from first passing, fed to feed hopper for second passing.

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Fig.3 IIPR (Indian Institute of Pulse Research) mini *dhal* mill

First passing and second passing of Lathyrus seeds

From the milling of *Lathyrus* seed using IIPR mini *dhal* mill at first and second passing the maximum *dhal* recovery was obtained. The *dhal* recovery percentage obtained after water soaking treatment in the first and second passing are given in Table 1, 2

Table 1: Recovery of *dhal* percentage after first passing

S.No.	Treatment	Soaking time (h)	First passing				
			dhal	broken	gota	husk	powder
1.	Water	2	60.50	5.01	11.83	15.68	3.33
2.	Water	4	65.01	4.16	9.66	14.33	3.49
3.	Water	6	64.66	6.34	8.43	13.85	3.73
4.	Water	8	72.06	4.78	7.01	13.26	1.21
5.	Water	10	71.68	3.49	7.54	13.23	1.81
6.	Water	12	70.03	4.28	8.66	11.93	2.91

Note - All the values are average of two replications.

Table 2: Recovery of *dhal* percentage after second passing

S.No.	Treatment	Soaking Time (h)	Second passing				
			dhal	broken	gota	husk	powder
1.	Water	2	64.99	6.49	1.66	18.66	4.16
2.	Water	4	68.91	5.33	0.83	16.66	3.99
3.	Water	6	68.43	7.36	0.71	16.06	4.23
4.	Water	8	75.76	3.52	0.58	15.53	1.48
5.	Water	10	75.48	4.36	0.41	15.86	2.15
6.	Water	12	73.80	5.36	0.49	14.18	3.58

Note -All the values are average of two replications,

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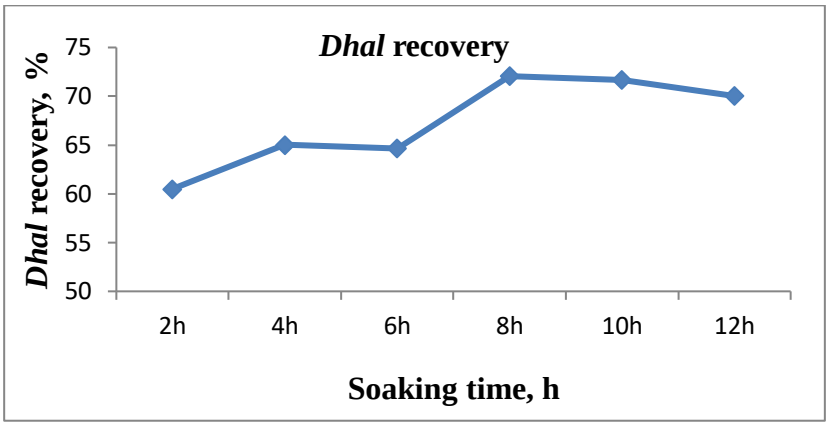

Fig.4 Effect of water soaking treatment on *dhal* recovery after first passing

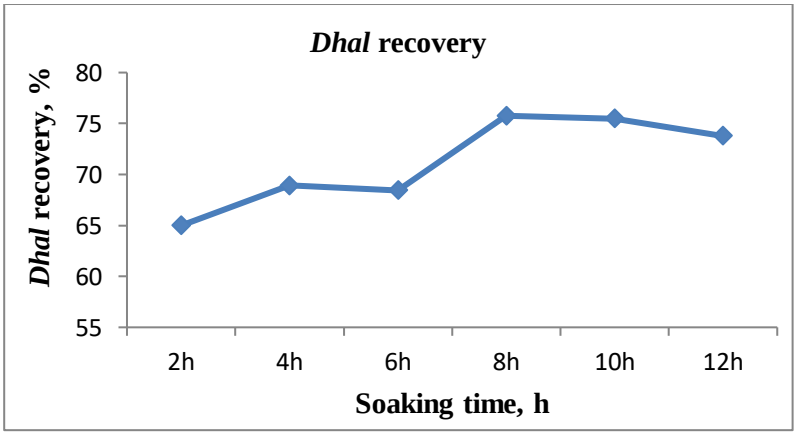

Fig.5 Effect of water soaking treatment on *dhal* recovery after second passing

Statistical Analysis

All the experimental data were statistical analysed using online software OP STAT.

Formula used for milling calculation

Dhal recovery percentage (%)

The dhal recovery in percentage was calculated by weight of dhal after milling to the weight of whole seeds. The sample was carefully weighted and following formula was used to calculate the dhal recovery (Singh, 2017).

$$\textit{Dhal}\text{ recovery (\%)} = \frac{\text{Weight of } \textit{dhal} \text{ after milling}}{\text{Weight of whole seeds after milling}} \times 100$$

Husk percentage (%)

The husk percentage was calculated by using weight of husk after milling and initial weight of whole seeds. The sample was carefully weighted and following formula was used (Singh, 2017).

$$\text{Husk (\%)} = \frac{\text{Weight of hush after milling}}{\text{Weight of whole seeds after milling}} \times 100$$

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Broken percentage (%)

The broken percentage was calculated by the ratio of weight of broken seeds after milling to the initial weight of whole seeds. The sample was carefully weighted and broken percentage was worked out using the formula (Singh, 2017).

$$\text{Broken percentage (\%)} = \frac{\text{Weight of broken after milling}}{\text{Weight of whole seeds after milling}} \times 100$$

Powder percentage (%)

The powder percentage was calculated by weight of powder after milling dividing by initial weight of whole seeds. The sample was weighted using precision weighing balance and following formula was used (Singh, 2017).

$$\text{Powder (\%)} = \frac{\text{Weight of powder after milling}}{\text{Weight of whole seeds after milling}} \times 100$$

Gota Percentage (%)

The gota percentage was calculated by weight of gota after milling to the initial weight of whole seeds. Lathyrus seeds the sample was weighted and following formula was used for gota percentage (Singh, 2017).

$$\text{Gota (\%)} = \frac{\text{Weight of gota after milling}}{\text{Weight of whole seeds after milling}} \times 100$$

Fig.6 *Lathyrus dhal* for different treatment hour's **Fig.7** 1kg packaging of *Lathyrus dhal* for different treatment hours

Results and discussion

From the results of experimental studies it can be concluded that the water treatment is best situating to achieve the maximum dhal recovery. From the study it was found that the maximum dhal recovery was recorded as 75.76 percent after 8 hour water soaked Lathyrus seeds. The analysis of variance (ANOVA) shows the significant result of *dhal* recovery.

Conclusion

From the study it was found that the maximum dhal recovery was recorded as 75.76 percent after 8 hour water soaked Lathyrus seeds.

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