Volume-3, Issue-12, Dec-2014 • ISSN No 2277 - 8160

Research Paper | Home Science

# Effect of Different Types of Pesticide Treatments on Cooking Quality of Brinjals

**Dr. Mrs. Rohini H. Kalikar** — Assistant professor L.A.D. & Smt.R.P. College For Women, Nagpur

**Dr. Mrs. Deepali S. Kotwal** — Associate professor L.A.D.& Smt. R.P. College For Women , Nagpur

**ABSTRACT**

*Today for getting all the food in their original, uncontaminated state is becoming difficult or rather impossible. Rampant use of chemical resulted in change of natural taste, texture, and even the colour, and luster of the vegetables grown in the farms. Today we observe the cooking quality of the vegetables is declining. To get reason for this decline in cooking quality present study was undertaken. Brinjal plants were grown in pots & divided in to six groups each group was treated with different pesticide. Two cooking methods were adopted and were subjected for sensory evaluation for cooking quality and statistical applications. The study states that cooking quality of Brinjals from Bio pesticide treated group was excellent near to untreated, but with chemical pesticide, as the concentration of chemical pesticide increases the cooking quality of the Brinjals declines.*

**KEYWORDS : Pesticides, cooking quality, Brinjal, Bio-pesticides**

## Introduction

[1]One of the most significant landmarks in the history of civilization that man cultivated plants to get food. Whenever plants are grown whether for subsistence or meeting other necessities or even for aesthetic purposes, growers are keenly interested in having an assured yield or return. Much care is taken to protect the plants from any pest attack. It ultimately affects the yielding capacity of the plant. Constant care and protection of plants are taken to draw full benefits from the plants. Here comes the role of pesticide for protection plants from pests.

[2]Prior to World War II, most pesticides were inorganic chemicals which were simple in nature and a few insecticides were of plant origin. The discovery of Dichloro Diphenyl Trichloroethane (DDT) in 1939 followed by the discovery of gamma-isomer of Benzene Hexachloride (BHC) revolutionized the concept of chemical method of pest control. This was soon followed by Gradually other groups of insecticides continuously appearing in the market.

[3]However, the use of Organochlorine insecticide has been severely restricted in many of the developed countries, but their manufacture has been continued. A large number of pesticides are used in agriculture for protection against diverse pests. Pesticides being poisonous in nature not only to the target pests but also to warm blooded animals including men, their residues left over the sprayed surface of the crop, or in the soil have become a matter of concern in respect of health hazards to men and animals and environmental pollution. Residue level of any pesticide, apart from the physico-chemical properties depends on a number of factors such as 1) Crop and its variety, 2) Climatic conditions, 3) Doses of pesticides, frequency and time interval, 4) Method of application, 5) Treatment of the crop produce as washing, drying or cooking, 6) Soil type, pH and texture. Thus problem of pesticide residue varies from country to country depending on agro-ecological conditions as well as cropping conditions and intensity.

[4]Pesticide use in India has tripled in the past two decades; surveys have shown that the Indian's daily intake of pesticides residue in food is among the highest in the world. The Health Ministry banned the use of DDT in 1992 and BHC in 1997 but it's a fact that both are still widely sprayed, especially by vegetable farmers. Even now many farmers ignore the rules prescribing a waiting period between spraying and harvest, and bringing such products in market which are not safe for the consumers. At domestic level it is impossible to test the vegetables for their pesticide residue content, therefore there is a need to develop some house hold techniques to identify pesticide residue or some guidelines has to be developed for the home makers to identify it before consuming, the cooking quality of vegetables can give some idea about it. The present study was planned to help home maker in their vegetable consumption. The aims of the present study were to observe the fruits obtained by different methods, and to study cooking quality of Brinjals from different pesticide treatment.

[5]Gandhi Ranu et.al. (2010) after conducting a study reported that pesticide residue still remain in food after its preparation. Federal and state agencies are encouraging farmers to move towards Integrated Pest Management (IPM) techniques to reduce pesticide use and pesticide cost. IPM recommends using pest resistant varieties of plants and the natural enemies of pest rather than chemical pesticides. It has suggested to use chemical pesticides only when needed and not as a routine.

[6]Vemuri Shashi Bhushan et.al. (2014) studied methods of removal of pesticide residue in tomato. Pesticide treated samples were subjected to different decontamination methods viz, washing under running tap water, 2% salt solution, direct cooking, dipping in 2% salt solution and cooking and were analyzed for the pesticide content. Cumulative effect of all four house hold process cause substantial reduction in residues up to 95%. However, cooking with pressure cooker for 5 Minutes reduced pesticides from 30-93%.

[7]Shoeibi Shahram et. Al. (2011) studied effect of cooking process on pesticide residues in Rice and reported that the concentration of pesticides and percentage of pesticide amounts after the cooking showed percent of loss in pesticide residue. Different parameters such as vapor pressure, boiling point and suspect ability of compound to hydrolysis, could be responsible for the loss of pesticide residues during the cooking process.

[8]Sun Li et.al (2011) studied the effect of washing and cooking on chlorpyrifos and its toxic metabolites in vegetables and reported that many factors ; washing solution, pH value, cooking mode, processing time etc. affected the hydrolysis of carbopyrifos for removal of pesticide residue from leafy vegetables during washing. Removal of residues after cooking was more effective than washing alone.

[9]Naik I. (2009) studied food processing a tool to pesticide residue dissipation, reported that. Food processing treatments such as washing, peeling, canning, or cooking lead to a significant reduction of pesticide residue. Baking , bread making, dairy product manufacturing, drying, thermal processing, fermentation, freezing, infusion, juicing, malting, milling, parboiling, peeling, peeling and cooking, storage, storage and milling, washing and drying, washing and peeling, washing and peeling and juicing and wine making leads to large reductions in residue levels in the prepared food.

[10]Beena Kumari (2008) studied effect of household processing on

reduction of pesticide residue in vegetable. She reported that residue level of organochlorides, synthetic pyrethroids, organophosphates and carbamate were determined in unprocessed and processed three vegetables Viz; Brinjal, Cauliflower and Okra to know the residue levels and evaluated the effect of different household processing ( washing , boiling/ Cooking) on reduction of residues. Maximum 77 % reduction of organophosphate in Brinjal followed by 74 % Cauliflower and 50 % in Okra by washing was observed. The same trend was observed by boiling process where maximum 100 % reduction of organophosphate insecticide was observed in Brinjal followed by 92 % in cauliflower and 75% in Okra. Boiling was found comparatively more effective method than washing in dislodging the residues.

Keeping in view all the above literature no study has been carried out on the cooking quality of Brinjals treated with different pesticide has been undertaken, therefore present study was planed.

***Methodology* :-**

A pilot study was done to collect information about current trends in vegetable farming, type of pesticides used and methods of cultivation of Brinjals. Brinjal plant was selected for the present study because, Brinjals are commonly consumed by majority of population irrespective of their economic conditions and two cooking methods are very popular among the Indians those are Boiling and Roasting the Brinjals for cooking. Cultivation of Brinjal was planed according to the information obtained by the pilot study. The selection of pesticides, their doses and interval between two spraying was scheduled according to the average observations obtained.

The seeds were sown in the thick layer of soil. Five inches height saplings were transplanted into big poly bags (15"x10") and respective pesticide was given at the rate of 4-5 ml/lit, at the interval of 15 days. 120 plants were divided in to six groups. In each group there were 20 plants, and to these six groups different pesticide treatment was given. These groups were given code names as SA, SB, SC, SD, SE and SF. Where SA was untreated group, SB Bio pesticide group, and rest four were [11]chemically treated pesticides having lowest to highest concentration, namely slightly toxic, moderately toxic, highly toxic and extremely toxic pesticide respectively. As shown in Table No-1

**Table No-1 Six different groups of plants and their pesticide treatments.**

| →Pesticide Treatment | Untreated | Bio- Pesticide | Chemical Pesticides | | | | Total |
|---|---|---|---|---|---|---|---|
| | | | S.T.P. | M.T.P. | H.T.P. | E.T.P. | |
| Group/ Code of Sample | SA | SB | SC | SD | SE | SF | 6 Groups |
| No. of plants | 20 | 20 | 20 | 20 | 20 | 20 | 120 |
| Name of pesticide used | -- | BioMet/ Bio-Pro | Bordraux | Mono Crotophos | Endosulphan | Phorate | |

The fruits obtained from each group were observed for its luster, colour, texture and appearance and were also noted down. This experiment was carried out thrice and average observations were drawn. Two simple methods of cooking were adopted to see the effect of cooking on the various pesticide treated Brinjals. Boiling method of cooking and Roasting method of cooking were undertaken for the Brinjals obtained from different treatments. Initially the procedure was standardized for the amount of Brinjals, size of utensils and cooking time, and were subjected to 12sensory evaluation for 3 trials by selected panel of trained judges (No. of Judges 8).

**Table No-2 Ingredients for recipe No-1 & 2.**

| Recipe No-1 ( Subji ) Ingredients | Amount | | Recipe No-2 ( Bharta ) Ingredients | Amount | |
|---|---|---|---|---|---|
| Brinjals | 100 gm | Cooking Time= 10.00 Minutes | Brianjals | 100 gm | Roasing Time= 5 .00 Minutes. |
| Oil | 7 ml | | Oil | 5 ml | |
| Mustard seed | 1/8 tsp | | Musterd seed | 1/8 tsp | |
| Chilli powder | 1/8 tsp | | Chilli powder | 1/10 tsp | |
| Turmeric powder | 1/10 tsp | | Salt | 1/8 tsp | |
| Salt | 1/4 tsp | | | | |
| Water | 50 ml. | | | | |

**Development of score card**.

The score card was developed for this study in order to judge the, cooking quality of the Brinjals. The ranking scale was developed and scores were defined as a four point scale and accordingly each quality was graded by scores and the results were tabulated taking average of three trials. The scoring system followed was as shown in Table No –3

**Table –No-3 Score system for sensory evaluation for cooking quality**

| SCORES | Cooking quality | |
|---|---|---|
| Method | Boiling | Roasting |
| 4 | Well cooked | Well cooked |
| 3 | Slightly raw | Slightly raw |
| 2 | Over cooked | Under cooked |
| 1 | Uncooked | Burnt |

**Statistical Design**

The whole data was complied and tabulated, all the reading were compared with the reading of the SA (Untreated) group. The analysis of variance was done by two way (ANOVA),i e. "F" test to find out the variation among characters and treatments and 't' test was applied to compare the different treatments with untreated.

**Results and discussions.**

**General characteristics of obtained Brinjals**

Brinjals obtained from different groups were observed for their general characteristics, the observations noted down were as shown in table No.-4

**Table No-4 General characteristics of obtained Brinjals (With Sample code)**

| Ranks | I | II | II | IV | V | VI |
|---|---|---|---|---|---|---|
| Size | SF | SE | SD | SB | SC | SA |
| Luster | SB | SA | SC | SD | SE | SF |
| Colour | SB | SA | SC | SD | SE | SF |
| Appearance | SB | SA | SC | SD | SE | SF |

As shown in the above table, size of the Brinjals obtained from untreated and Bio treated group ranked VI and IV position respectively, they were lighter in weight as well. Increase in the concentration of chemical pesticide resulted in bigger size and increased weight of the Brinjals.

The luster, colour and appearance improved with lesser concentration of chemical pesticides. Natural colour and luster was observed in non chemical treated groups. The Bio treated and untreated ranked I$^{St}$ and II$^{nd}$ position respectively.

**Cooking quality :-**

SA & SB showed better cooking quality than the other group. They get cooked and roasted quickly and retained natural taste. Whereas SC, SD, SE, SF were found to be hard to cook, in case of SE & SF the skin remains uncooked even after prolonged cooking and inner part of the vegetable becomes very soft and could not retain natural taste.

**Sensory Evaluation :-**
Table No – 5 shows the mean scores of three trials for the sensory characteristics of six different pesticides treated Brinjal Recipe No-1.& Recipe No-2

**Table No-5**
**Mean scores with SD. For cooking Quality of Brinjals from six different groups.**

| | Recipe No.1 | | | Recipe No.2 | | |
|---|---|---|---|---|---|---|
| Sample code | Mean score | SD | Rank | Mean score | SD | Rank |
| SA | 3.67 | ±1.13 | II | 3.66 | ±0.29 | II |
| SB | 3.96 | ±0.00 | I | 4.00 | ±0.00 | I |
| SC | 3.41 | ±1.62 | III | 3.70 | ±0.26 | III |
| SD | 2.96 | ±5.76 | IV | 3.08 | ±0.23 | IV |
| SE | 2.83 | ±1.79 | V | 2.58 | ±0.15 | V |
| SF | 2.72 | ±2.91 | VI | 1.83 | ±0.41 | VI |

Score pattern:- Very-good.(4), Good (3) , Fair (2) and Poor (1)

Among these six treatments, Biological pesticides treated Brinjal of recipe No.1&2 obtained the highest o mean score (3.96 & 4.00)) and were ranked first in their cooking quality. This score shows that the product fall between good & very good character according to the scoring scale. It was then followed by Untreated Brinjals, and chemical pesticide treated groups such as slightly toxic, Moderately toxic, Highly toxic &Extremely toxic chemical pesticide treated Brinjal recipes in descending order. With the increase in chemical concentration decrease in cooking quality was observed. The value of standard deviation for SA and SB group shows that it was accepted by the judges unanimously (as only slight deviation was observed) .The cooking quality of Brinjals from SE and SF group showed cooking quality in between fair to poor. Brinjals from SE and SF groups were hard to cook, required longer time to cook and the skin remained tough even when inner part was totally de shaped.

The scores given by panel member showed significant difference between cooking quality of Brinjals with the untreated group. The significant difference (value of 'F'is 32 & 8 respectively for Recipe No-1 and 2) obtained by One –way ANOVA method showed significant difference, therefore to know the actual difference between the Means of the scores of SA with other groups value of "t" was calculated .

The table shows that there is significant difference among the treatments. Therefore the five different groups were compared with untreated and the result obtained by 't' test is given in Table No-6

**Table No-6Value of 't' obtained by comparing samples with untreated .**

| Sample code | Value of 't' | |
|---|---|---|
| | Recipe No-1 | Recipe No-2 |
| SB | 1.93 | 3.09 |
| SC | 1.08 | 0.30 |
| SD | 2.21 | 3.97 |
| SE | 2.95 | 8.71 |
| SF | 2.39 | 7.63 |

Table value at 5 % = 1.761 & 1% = 2.624.

The recipes when compared with untreated, SE & SF showed high significant difference. Which suggest that the judges do not prefer these samples because they were drastically different from untreated or natural. Where as in SB sample difference observe was insignificant, which means that this sample was of similar character nearer to natural or untreated or it retained its natural taste of Brinjals. That might be the reason for its high acceptance. It is very clear from the table that, as the level of difference increases there was decrease in preference.

There four we can conclude from result obtained by sensory evaluation, that SB sample was highly accepted and was followed by SC,SD, SE & SF.

**Conclusions**
Use of chemical pesticide does affect the size, colour, luster of the Brinjals obtained as compared to the untreated one. Use of Bio pesticide can give results much nearer to the untreated Brinjals in respect of their cooking quality is concern. Cooking quality declines with the increased concentration of chemical pesticides. While selecting the Brinjals from the vegetable market, select darker lustrous, lighter in weight and small size Brinjals. If the Brinjals requires longer time to cook and still the skin remains the tough,that may indicate the presence of chemical pesticide residue in it.

## REFERENCES

1- Chattopadhyay, S.B.,(1990) Principles and Procedures of plant protection, III Edition, Chapter 1, P-1 | 2- Chattopadhyay, S.B., (1990) Principles and Procedures of plant protection, III Edition, Chapter 4 P-70 | 3- Chattopadhyay, S.B., (1990) Principles and Procedures of plant protection, III Edition, Chapter 15, P-309 | 4- Kabra (1999) Punjabilok, Impact of pesticide, A critical & depth scientific analysis. | http://www.panjabilok.com/medicos. | 5- Gandhi Ranu (2010), Consumer concern about pesticides in food. http://www.enviroconcern.cornell.edu/fact sheet/pesticide/fs 24. consume.cfm.p-4 | 6- Vemuri Shashi Bhushan et.al. (2014) | 7- Shoeibi Shahram et.al. (2011), Effect of cooking process on the Residues of three carbamate pesticides in Rice. Indian Journal of Pharmaceutical Research.Iran Jpharm Res.2011.Winter 10(1):p-119-126 | http://www.nebi.nim.nih.gvjpmc/articles/pmc | | 8- Sun Li et.al. (2011) The effect of washing & cooking on chlorpyriphos & its matabolites in Vegetables. Food Control Vol. 22issue 1 Jan 2011. P-54-58. | 9- Naik I.(2009), Food processing a tool to pesticide residue dissipation, Food Research International Vol. 42 Issue 1 Jan, 2009.P-26-40. | 10- Beena Kumari (2008), Effect of Household processing on reduction of pesticide residues in vegetables.ARPN Journal of Agri & Biological Science Vol.3 Issue 4 July 2008. | 11- Chattopadhyay, S.B., Principles and Procedures of plant protection, III Edition, Chapter 14, P-290-291 | 12- Mane Shakuntala , Food Facts and Principles, Sensory Evaluation Chapter 28, P-438-440. |