

# Nutrient alteration study on leafy onion (*Allium cepa* L.) infected with *Alternaria porri* from Maharashtra state, India.

Dongre Mayur A. and Borse K.N.

Post Graduate Department of Botany, S.S.V.P. Sanstha's L. K. Dr. P.R. Ghogrey Science College, Dhule, Maharashtra, INDIA.

## Abstract

Onion (*Allium cepa* L.) is a crop crops grown throughout Maharashtra, specially in North Maharashtra reason. This is a main crop of Khandesh region especially Dhule and Nasik districts. This crop is taken throughout the year. Bulbs are the main product of plant but plants leaves are also important source of vegetable. Onion leaves are infected by three most important fungi, which cause heavy loss to the crop. These three pathogens are *Alternaria porri* (Ellis), *Stemphyllium vesicarium* (Wallr) E.G. Simmons, and *Cercospora duddiae* Welles. But the intensity and frequency of *Alemaria* rot is most severe.

**Keywords:** Fungal diseases, Allium, vegetables.

## 1. Introduction

Onion, *Allium cepa* is an herbaceous biennial plant belongs to family *Liliaceae* grown for its edible leaves and bulb. The leaves are erect and 4 to 8 per plant.

Onions crop is grown throughout the world for food purposes. In India, Maharashtra stand first in Onion production (30.22% of total onion production in India: ICAR Directorate of onion and Garlic research1, 2013-14).

Purple blotch caused by *Alternaria porri* (Ellis) was observe in the field as well as in market during early summer season. White small spots first observed on the leaves of garlic plant. As the bulb mature the severity of disease also increased. Crops of garlic from Khandesh region mostly affected by this economically important disease in month of January to March, it tries to understand that transition period of winter to summer season is more favourable for pathogen.

## 2. Material and Methods

For pathological study and nutritive study on onion and garlic plant samples were collected from field as well as from market from where they are subjected to distributed as food (vegetable).

## 3. Symptoms of disease: -

Leaves are susceptible to this pathogen. first symptom of this disease was started as white small spots present on the upper surface of leaf, which later enlarge and converted to dark purple or brown in colour. Initially small portion covered by the disease but later spot enlarges and may occupy all leaf surface. It directly affects the photosynthetic activity.

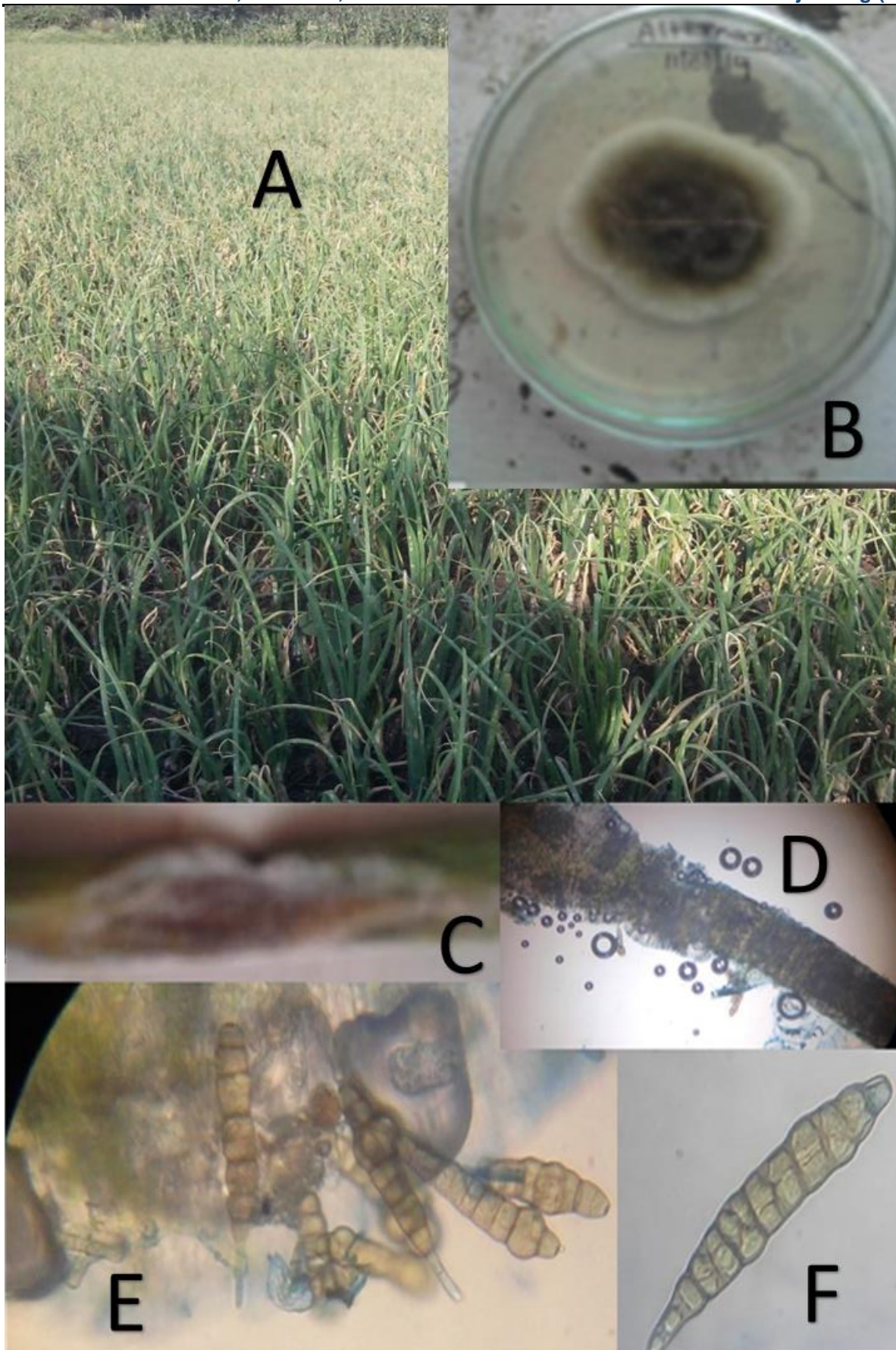
The pathogen isolated from diseased site were cultured on PDA later repeated subculture form a pure plate. In PDA *Alternaria porri* grow luxuriously at room temperature. Growth was started as white concentric spot. The spot acquires dark colour as the luxurious conidia forms. Within 5 to 7-day full plate occupied with pathogen. From reverse side of plate dark black colour seen. Colony is dark olivaceous in colour, with cottony fluffy growth, irregular shape colony, entire margin.

**TABLE:- Site of collection and morphology of cultured pathogen on PDA media.**

Sr. no.	Place of Collection	Geographical Data	Culture appearance on PDA plate		Conidia Length X Diameter (µm)	Beak length (µm)
			Colour of colony	Appearance		
1.	Khandesh -Dhule	21°04'56.8"N 74°50'33.5"E	Olive green	Fluffy	198 X 16	94
2.	Khandesh -Nashik	20°08'40.0"N 74°14'33.9"E	Dark brown	Fluffy	257 X 18	120
3.	Konkan Mumbai	19°04'18.0"N 73°00'31.7"E	Olivaceous brown	Fluffy	210 X 17	95
4.	Konkan Thane	19°11'39.1"N 72°58'38.8"E	Olive green	Fluffy	89 X 13	42

5.	Vidharbha – Wardha	20°44'08.7"N 78°35'49.6"E	Dark brown	Fluffy	110 X 15	54
6.	Vidharbha -Gondia	21°27'26.0"N 80°11'32.2"E	Dark brown	Fluffy	240 X 18	117
7.	Western Maharashtra Pune	18°34'25.0"N 73°46'36.6"E	Dark brown	Fluffy	230 X 16	112
8.	Western Maharashtra Sangli	16°51'26.6"N 74°33'49.9"E	Dark brown	Fluffy	105 X 12	49
9.	Marathwada Aurangabad	19°51'46.7"N 75°20'36.7"E	Dark brown	Fluffy	92 X 14	44
10.	Marathwada Latur	18°24'20.3"N 76°34'42.9"E	Olive green	Fluffy	195 X 17	91





**Image:-** Onion field showing infection of *Alternaria* and *Stemphylium* (A), pure culture of *Alternaria porri* on PDA (B) , portion of leaf shows symptoms( C), section of leaf through infection(D), mycelium and conidia under low resolution (E) and high magnification ( F).

#### 4. Morphological characters: -

Literature provided by Ellis M.B., (1971), Bisht, I.S. and Agrawal,R.C. , (1993), Suheri H. and Price T.V (2000) and Shehu K. and Aliero A.A (2010) are helpful to confirm the pathogen The septet hyaline hyphae on maturation form dark colour. Conidiophores are present singly or in groups, brown in colour. They are erect cylindrical and septet. Conidia ae

straight, sometimes it may be curved at some point, with brown colour. Longitudinal septae may be up to 3. Numbers of transverse septae are 6 to 8.

Size of conidia ranges from 89  $\mu\text{m}$  to 257  $\mu\text{m}$  in length. The width of conidia ranges from 13 to 18  $\mu\text{m}$ . they are present. Beak length of conidia was found similar to body length. But 3 or four times thinner in diameter.

##### 5. Pathogenicity test: -

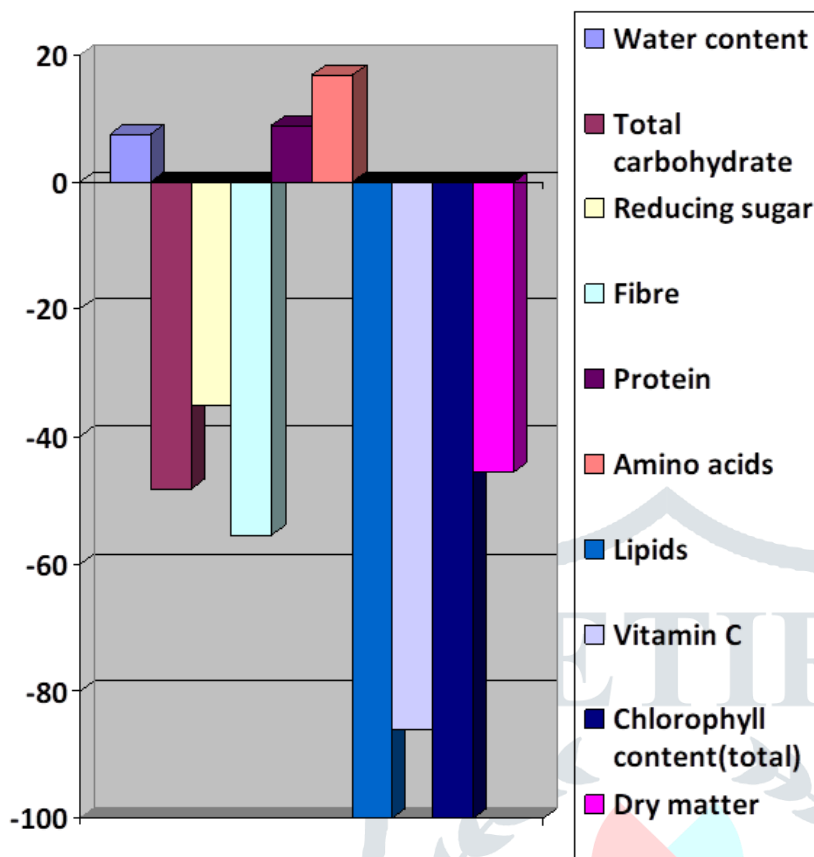
Pure culture obtained from diseased leaves of garlic were inoculated on the growing garlic plant. The plant was kept under high humidity condition. after 10 days the symptoms are seen on inoculated site. Comparison of symptoms was carried with that of original field crop.

##### 6. Nutrient alteration study: -

Total Carbohydrate was estimated by Hedge, J E and Hofreiter, B T (1962) Antrone method. absorbance with 630nm using systronics 2202 double beam UV- Visible spectrophotometer. Crude fibre is mainly consisting of cellulose and lignin and some minerals. Acid and alkali treatment the cellulose and lignin were degraded. The initial and final weight after ignition at 600 °C give the crude fibre content in the sample. Reducing sugar were estimated using arsinomolybdate reagent by following the method of Nelson-Somogyi. Lawry method was followed for estimating protein. Oil from were extracted through Soxhlet apparatus using Petroleum ether as solvent, following the protocol given by Bligh, E.G., and Dyer, W.J., (1959) and Sadasivam S. and Manickam, (2005). Ninhydrin method was applied for estimation of free amino acids. Dry matter content and water content were analysed by using procedure given by Ruck (1969). Vitamin C content estimated by using 2,6- dichlorophenol-endophenol dye solution, procedure given by Sadasivam and manickem.

**TABLE:- 2 Nutrient analysis and comparison with diseased vegetable**

Sr. no.	Nutrients	Content in 100gram fresh material	Content in 100gram diseased vegetable	% alteration due to disease
1.	Water content	67 Grams	72 Grams	7.462
2.	Total carbohydrate	11.2 Grams	5.8 Grams	-48.214
3.	Reducing sugar	4.0 Grams	2.6 Grams	-35
4.	Fibre	5.4 Grams	2.4 Grams	-55.556
5.	Protein	9.0 Grams	9.8 Grams	8.889
6.	Amino acids	1.3 Grams	1.52 Grams	16.923
7.	Lipids	0.2 Grams	00 Grams	-100
8.	Vitamin C	43mg	6mg	-86.046
9.	Chlorophyll content(total)	12.8mg	00mg	-100
10.	Dry matter	11.2 Grams	6.1 Grams	-45.535

Graph :- Alteration of nutrient due to fungal pathogen *Alternariaporri* on Onion leaves

## 7. Conclusion

In this study various parameters like symptoms on plant, microscopic and macroscopic examination and culture characters prove the pathogen and pathogenicity of *Alternaria porri*. *Alternaria porri* and *Stemphylium vasicarium* mostly grow together on onion crops. *Alternaria* is most abundant among the field of onion crops in Maharashtra. Nutrients like Protein and free Amino acids are seems to be elevated while other content are reduced which includes Dietary fibres Vitamin C, Carbohydrate (Reducing and Non reducing), lipid etc.

## 8. Acknowledgements

Author is thanking to farmers and shopkeepers who permit for visiting and collecting samples and also thankful to principal of S.S.V.P. S's L.K. Dr. P.R. Ghogrey Science College, Dhule for providing laboratory.

## 9. References: -

1. Bisht, I.S. and Agrawal, R.C., 1993. Susceibility to purple blotch (*Alternaria porri*) in garlic (*Allium sativum*). Annals of Applied Biology, 122, 31-38.
2. Bligh, E.G., and Dyer, W.J., 1959. A rapid method of total lipid extraction and purification. Canadian Journal Of Biochemistry and Physiology. 37:8, 911-917. (<http://www.nrcresearchpress.com/doi/pdf/10.1139/o59-099>)
3. Brewster, J.L., 2008. Onion and other Vegetable Alliums, Volume 15 of Crop Production Science in Horticulture, 15, pp454. Available online on [https://books.google.co.in/books?id=eW\\_TiZ1jHcKc&pg=PA1&lpg=PA1&dq=of+central+Asia+it+is+originated+\(Brewster+2008+allium&source=bl&ots=SHAnUE7w6-&sig=874vba86t3X8lq3\\_egmzE3BWCQw&hl=en&sa=X&ved=0ahUKEwjwMSCt7LZAhUJT7wKHbJIBtAQ6AEI STAD#v=onepage&q=of%20central%20Asia%20it%20is%20originated%20\(Brewster%202008%20allium&f=false](https://books.google.co.in/books?id=eW_TiZ1jHcKc&pg=PA1&lpg=PA1&dq=of+central+Asia+it+is+originated+(Brewster+2008+allium&source=bl&ots=SHAnUE7w6-&sig=874vba86t3X8lq3_egmzE3BWCQw&hl=en&sa=X&ved=0ahUKEwjwMSCt7LZAhUJT7wKHbJIBtAQ6AEI STAD#v=onepage&q=of%20central%20Asia%20it%20is%20originated%20(Brewster%202008%20allium&f=false)
4. Ellis M.B., Dematiaceous Hyphomycetes. CMI, Kew, Boco, Surrey, England (1971)
5. Hedge, J.E. and Hofreiter, B.T. (1962). Determination of reducing sugar and carbohydrates: Anthrone colorimetric method, Methods in Carbohydrate chemistry, 17 (Eds. Whistler R.L. and B.Miller, J.N., Academic press, New York. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1265672/pdf/biochemj00980-0166.pdf>
6. [http://www.niftem.ac.in/admin/NewsDocument/01572014025730\\_022VegCropWiseDATA07-08-2014.pdf](http://www.niftem.ac.in/admin/NewsDocument/01572014025730_022VegCropWiseDATA07-08-2014.pdf) (Retrieved on 20/10/2015)
7. Leslie J.Harris and Mamie Olliver, (1942). the reliability of the Method for Estimating Vitamin C by Titration against 2:6- dichlorophenolindophenol. Biochemical journal, vol. 36, pp. 155-182
8. Lowry, O.H., Rosebrough, N.J., Farr, A.L. and Randall, R.J. (1951). Protein Measurement with the Folin Phenol reagent, Journal of biological chemistry, 193, pp.265on sugar determination, Journrl of Biological Chemistry, Vol.

- 195, pp. 19-23 [https://scholar.google.com/cholar\\_lookup?title=Notes+on+sugar+determination&author=M.+Somogyi&publication\\_year=1952](https://scholar.google.com/cholar_lookup?title=Notes+on+sugar+determination&author=M.+Somogyi&publication_year=1952)
9. Ruck, J.A. (1969). Chemical Method for Analysis of Fruit and Vegetable products Canada Department of Agriculture, pp. 68
  10. Sadasivam, S. and Maickam, A. (2005). Biochemical Methods, 2nd edition, New age International (P) Ltd., Publishers, New Delhi
  11. Shehu K. and Aliero A.A., (2010). Effects of Purple Blotch Infection on the Proximate and Mineral Contents of Onion Leaf, International Journal of Pharma Sciences and Research (IJPSR), 1(2), 131-133.
  12. Suheri H. and Price T.V., (2000). Infection of onion leaves by *Alternaria porri* and *Stemphylium vasicarium* and disease development in controlled environments, Plant pathology, 49, 375-382.
  13. Vegetable crop wise data year (2012-13). ministry of food processing industry, government of India; national Horticulture production database 2012-13 MoA, GOI

