

## RESEARCH ARTICLE

## A SURVEY ON A PLANT DISEASE, RED ROT OF SUGARCANE (*Collectotricum falcatum*) ON BAITADI DISTRICT

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## ARTICLE DETAILS

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## ABSTRACT

Our Survey area is Dilasaini, Ward no.5 of Baitadi District where sugarcane cultivation is widely done in almost all the households of that area and their main problem was red rot disease of sugarcane. We had collected data by using semi structured questionnaire and key informant survey (KIS) was also conducted. Pilot testing was also done to check the accuracy. Data entry was done using MS Excel and descriptive analysis was done using IPM SPSS V.20. Among the diseases of plants, *Collectotricum falcatum* is highly prevalent in Baitadi and has affected the sugarcane cultivation and production. It not only reduce the production but also causes decline in quality of sugarcane produce and our survey is based on status of people residing there, sugarcane status and *Collectotricum* presence, its causes, losses and the expectations of farmers regarding its management. We found that 81.81% were male headed and 18.18% were female headed, 59.09% were Brahmins, 22.72% were Chhetris, 12.12% were Yogis and 6.06% were Dalits. 36.36% have less than 5 ropani land, 40.905 have between 5 to 10 ropani and 22.72% have more than 10 ropani. 83.33% have given priority to jaggery production followed by 16.67% to juice extractions and 0% in sugar production. We found that 40.90% households has faced loss more than 60%, 40.90% household facing losses between 30-60% and 18.18% households were facing loss around 10-30%. 68.18% respondents have expectations priority on provision of subsidies, 16.67% respondents have on timely availability of planting material, 6.06% respondents have on fungicide availability, 4.54% have on irrigation facility and remaining 3.03% have on provision of research facility.

## KEYWORDS

Sugarcane, household, fungicide, questionnaire, *Collectotricum*

## 1. INTRODUCTION

Sugarcane (*Sachharum officinarum*) is the C4 plant known as the sugar factory is severely affected by the Red rot disease. The causative agent is *Collectotricum falcatum* and active perfect sexual stage is *Glomerella tucumanensis* (Went 1983). It is soil borne disease and popular yield limiting disease of sugarcane causing reduction in quantity and quality of the sugarcane in some sugarcane producing countries (Viswanathan and Rao, 2011). This causative agent of sugarcane is more saprophytic than parasitic, hence it cannot infects healthy plants. This pathogen invades in plant at young stage and less likely to invade at mature stages and is found in dead canes which infects the cane on later growing season. It infects the stalk tissues, a store house of sugar in sugarcane, which is considered as economically important and reduces the sugar content (Viswanathan and Samiyappan, 1999).

Red rot is identified as the major disease of standing stalks as well as of planted cuttings or seed pieces. It affects any parts of sugarcane but badly affects the stalk and show the symptoms of purplish discoloration of rind (Bourne 1934). Affected stalks shows the little sign of diseases at initial stage and is mostly seen during monsoon when third or fourth leaf withers away at tip as well as along the margin or whole leaf reflects the primary identification of the disease and after 10-12 days, whole crown dries up in some susceptible varieties. Red rot of Sugarcane causes deterioration of seed cane including stubbles as well as death of every stalks, decline in the

Sucrose content and juice quality (Abbott, 1938; Edgerton, 1955). It shows the symptoms characterized by intermittent red and white patches within the cane and produces the sour astringent alcoholic odor when cane splits.

Leaf color also changes from green to orange and then to yellow at third or fourth leaf stage. At severity, leaves dries up from bottom to top. During Invasion, host tissue reacts with, pathogen and causes advancement of hyphal invasion. The color of protoplasm changes and the gummy dark-red colored exudations oozes out from cells and fills the intercellular spaces and soluble pigment present in the ooze is absorbed by cell wall giving red rot appearance. At advanced stages red color spreads to neighboring tissues extending through various internodes and irregular patches are formed, that may be reddish or yellowish or white having red margins and is the proof of diseases (Sharma and Tamta, 2015). The bright color of rind disappears and it shrivels making black specks on shriveled rinds after stem is completely rotted. In some areas, it occurs as epidemic resulting complete withering of plants and huge crop loss.

Red rot is controlled by using healthy plant material from disease free area and the field affected with red rot must be rotated with rice for one season and other crops for two seasons (Singh, 2008; Shailbala, 2019). Sett treatment is done with Carbendazin@2.5 gm/lit. of water for 30 minutes (Subhani et al., 2008). Hot water and hot air treatment can be done (Viswanathan and Rao, 2011). Resistant varieties are Cos-767, Co-840, Co-1148, Co-1158, Bo-32, Co-975, 1148, 1158, 1336, 6611; Co. S 561,574; B.O.

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3, 10, 47 (Mohan and Sangeetha, 2009). Fungicide seems not to be effective as it is couldn't penetrate inside the stalk where pathogen and the symptoms were found so focus must be done on prevention. Infected shoots need to be removed (Yadav 2006).

Table 1: Binomial classification of Red Rot of Sugarcane	
Binomial Classification	
Kingdom	Mycota/Fungi
Division	Eumycota
Sub division	Deuteromycota
Class	Coelomycetes
Order	Melanconiales
Family	Melanconiaceae
Genus	Collectotrichum
Species	Falcatum
Common Name	Red Rot

## 2. METHODOLOGY

### 2.1 Study Area

A survey was carried out in Gokuleshwor VDC of Baitadi district which is inside Province 7. Baitadi district lies in high hills of Nepal at an elevation of 700m above mean sea level and lies between 27°30' North latitude and 83°27' East longitude. After knowing the Cropping practices and the crops they grow, we selected Dilasaini, ward no. 5 as our research area. In this area, most households were involved in Sugarcane cultivation among others areas of Baitadi District. Not only large land holders, even people with small land for cultivation were also involved in Sugarcane cultivation for their requirements. Sugarcane is grown as important cash crop by the people living in this area. They cultivate sugarcane to make juices, jiggery and many more. While visiting there for educational purposes, we found that peoples were facing the problems of Red rot of Sugarcane (*Collectotrichum falcatum*). So, we took that area as our study area to know about these diseases, its status, cause, losses caused by it and management problems including expectations of sugarcane farmers of that area.

### 2.2 Research Design, Data Collection and Data Analysis

The survey was carried out from 20<sup>th</sup> July to 17<sup>th</sup> of August, 2021 in Baitadi district ward no.5 Dilasaini area from where 66 respondents were selected randomly and key informant survey were also conducted. Data were collected using a semi structured questionnaire which focuses on both small and large Sugarcane producers. In order to set the precision of questionnaire and for determining effectiveness in gathering reliable and valid information, Pilot testing was also done in 12 households. Then the survey was continued accordingly where pre-tested house were not included. Data entry was conducted by using a MS Excel (2016) and for descriptive statistics, IBM SPSS V. 20 was used.

## 3. RESULT AND DISCUSSION

### 3.1 Socio demographic characteristics

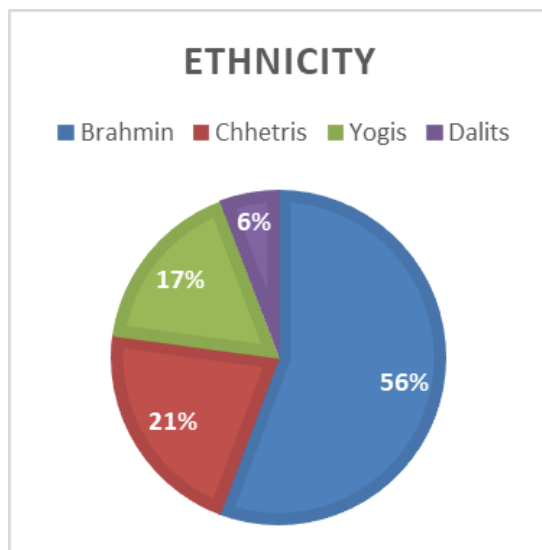


Figure 1: Ethnic groups located in Baitadi District

During Survey, 81.81% (54) households were found male headed and remaining 18.18% (12) households were found to be female headed. In our survey, we found that almost all the households were male headed. Some percentages were female headed only due to absence of male in the family. Male were gone abroad for foreign employment due to low economic condition. We had found that 59.09% (39) households were Brahmin followed by 22.72% (15) households of chhetris and then 12.12% (8) households of Yogis. Dalit population is only 6.06% i.e 4 households were found to be of Dalits.

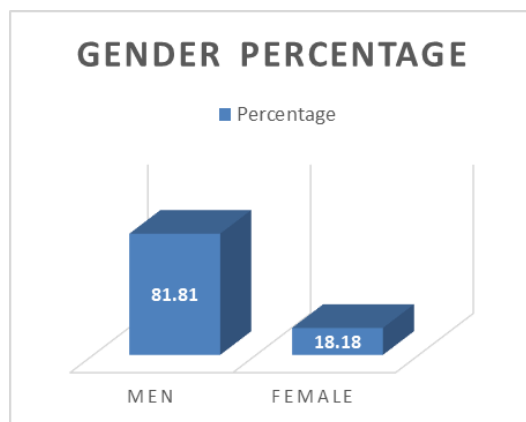


Figure 2: Gender percentage in Baitadi District

### 3.2 Land Holdings

In our survey we found out that 22.72% (15) households have land more than 10 ropani, 40.90% (27) households have land between 5 to 10 ropanies and remaining 36.36% (24) households have land less than 5 ropanie. Farmers of that are cultivate sugarcane in almost half of their land holdings and on remaining land, they grow cereals and vegetables. We also found that among the land holdings they have, some parts were left fallow throughout the year due to topographical problems which creates problem in cultivation practices.

### 3.3 Status of Sugarcane Cultivation and it's by products

In the process of surveying, we found that people of this area were attracted towards sugarcane cultivation. Almost in every house holding, it was found that sugarcane is grown in small to medium scales. Sugarcane is grown in around 50% of the cultivated land. In our survey, it was found that 59 households were involved in sugarcane cultivation and rest 7 were not involved due to lack of land for sugarcane cultivation. We had collected data regarding the byproducts of sugarcane and it was found that they extract juices and make jaggery from the sugarcane. No any farmers were found to sell sugarcane as raw materials for sugar production in sugar factory due to lack of information, transportation problems and many more. It was found that they produce jaggery from sugarcane and sells in the local market. In city areas, that jaggery produced in Baitadi districts are popular and fetch more price due to its distinct taste and flavor. We found that 83.33% (55) households had given priority to jaggery formation, 16.67% (11) were found giving priority to juices for home consumptions and 0 households were found to involve in sugar production.

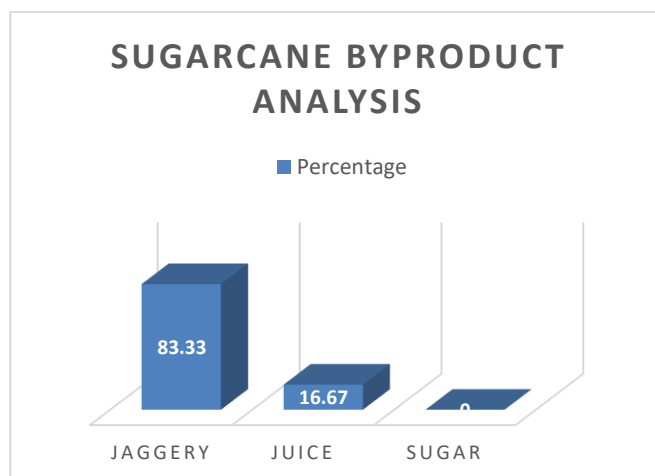


Figure 3. Sugarcane product production analysis

### 3.4 Problems of *Collectotricum falcatum* , Its Possible Causes And Loss

In our survey, we found that the *Collectotricum* problems was found in every household involved in sugarcane cultivation. We found that the main problems were use of previous planted planting materials. Almost all farmers of this area (around 100%) used to harvest the sugarcane and uses the stems of harvested sugarcane for next season cultivation. Nearly no any farmers (almost 0%) were buying the planting materials for planting. Due to this reason, this disease is still prevalent in that area. They use the infected material for planting even though they try to select the healthy ones but they are not fully healthy. We had asked all our 66 respondents about the losses they are facing due to this disease.

We found that 40.90% (27) households has faced loss more than 60% as they have more area cultivated with sugarcane, 40.90% (27) household facing losses between 30-60% as they have around half area cultivated with sugarcane and (18.18%) 12 households were facing loss around 10-30% as they have less area cultivated with sugarcane as well as have some amount of healthy planting material to cultivate small area in comparison to farmers who has cultivated sugarcane in medium to large areas. These findings are similar with findings which states that red rot of sugarcane causes losses at different intensity depending upon the cultivation practices and lands cultivated (Habib et al., 2016; Singh et al., 2008).

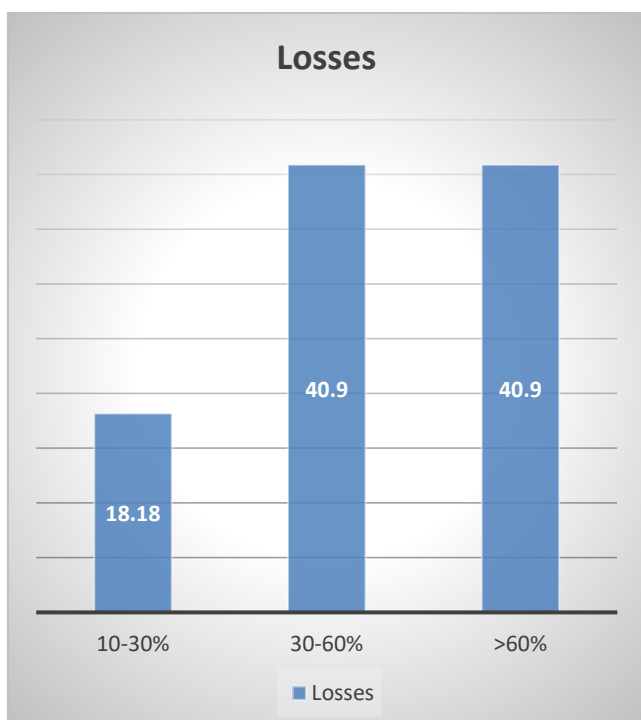


Figure 4: Intensity of losses due to *Collectotricum falcatum*

### 3.5 Management Problems and Farmers Expectations

In our survey we had asked respondents question regarding management problems of *Collectotricum*. 40 households said that unavailability of planting material is the main problem due to which they are still using the infected materials for planting, 17 household mentioned unavailability of Sett treatment chemicals and Fungicides as a major problem and remaining 9 households had assumed their careless management practices as problem asper their statement, they had no time or it takes more time to monitor the whole farm. We found that they had so much expectations regarding sugarcane cultivation and the disease arising with it.

We had asked them what they want for better sugarcane cultivation and production, 68.18% (45) respondents have expectations priority on provision of subsidies, 16.67% (11) respondents have on timely availability of planting material, 6.06 % (4) respondents had on fungicide availability, 4.54% (3) have on irrigation facility and remaining 3.03% (2) have on provision of research facility. This finding is somehow similar with findings which had illustrated need of sett treatments as well as healthy plant materials and which states the need as well as efficacy of fungicides for treating diseases (Malathi et al., 2017; Subhani et al., 2008).

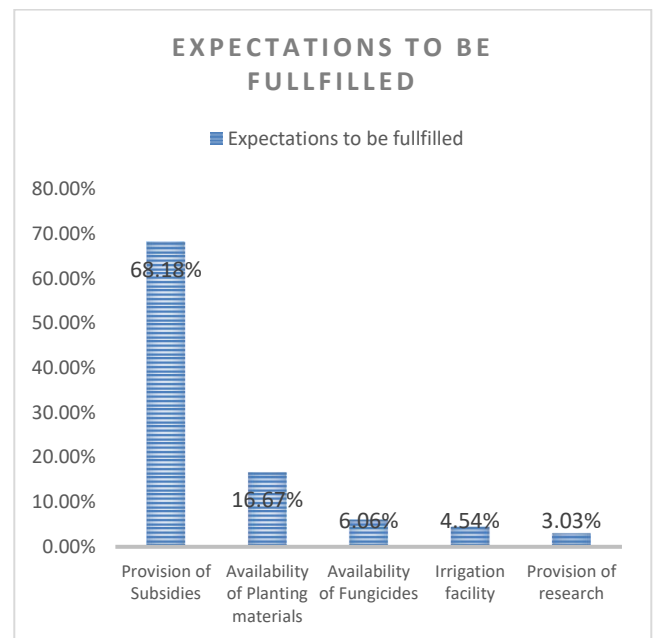


Figure 5. Expectations of Sugarcane Farmers

## 4. CONCLUSION

Sugarcane cultivation is the important part of the people residing in our survey area. They were facing the problems of *Collectotricum falcatum* causing great losses at various extent. People residing there had involved in sugarcane cultivation for sustenance as well as for somehow commercial purpose. They are growing sugarcane in around half of their land holdings. They produce juices, jaggery from sugarcane. They sell jaggery in the local markets which is popular in city area but due to unmanaged transporation and lack of information regarding the market demand of jaggery in city areas. People were facing the *Collectotricum* problems due to unavailability of suitable healthy plant materials during planting period, unavailability of fungicides to treat the *Collectotricum*, unavailability of suitable irrigation schemes, lack of research facility to identify problems and their solutions.

There is no provision of subsidies to the people involved in sugarcane cultivation from the government side. Due to which, they are afraid of participating in sugarcane production as it consume large area for its cultivation and huge amount of investment than cultivation of cereals and vegetables. From our survey we found that government should focus on that area for better production and improving the living standard of people residing there. Government should make and implement effective plans and irrigation schemes suitable for that area. Farmers of that area were expecting these kind of facilities from the government side which will encourage them to involve in Sugarcane production sectors without any hesitation.

Terai is covered with cereal production hence people gives priority to cereals before sugarcane but Hilly area especially our research area's soil condition is suitable for sugarcane production than that of cereals. Government should focus on these sectors. Promotion programs , awareness programs, demonstration of new feasible techniques, etc should be done so that they were familiar with high production techniques and also updated with market condition regarding demands. This Dilasaini area is suitable for sugarcane productions and government should focus on identifying problems and providing solutions to make it more favorable for the farmers to produce more.

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