

A. Dasgupta¹, B. Shiva¹, S. Dey², D. Dutta Ray³, S. Das¹, S. Dutta¹, A. Roy Barman¹, S. Mahapatra¹, A.K. Mandal¹, K. Karmakar², P. Debnath², R. Sadhukhan³, S. Sarkar³, B. Mandal⁴, D. Sarkar⁴ (dsarkar04@gmail.com)

1. Department of Plant Pathology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India -741252. 2. Department of Agricultural Entomology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India -741252. 3. Department of Genetics and Plant Breeding, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India -741252. 4. Department of Agricultural Chemistry and Soil Science, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India -741252.

Introduction:

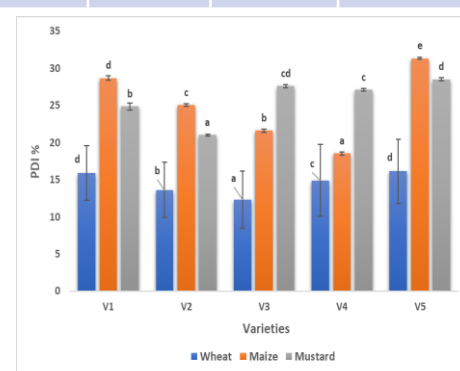
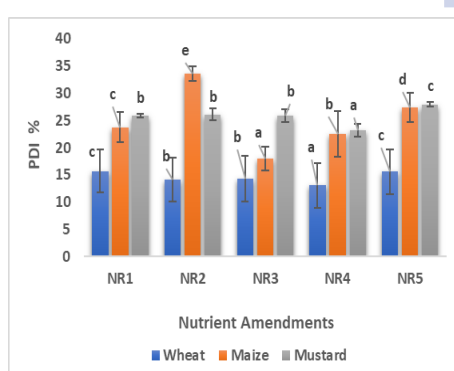
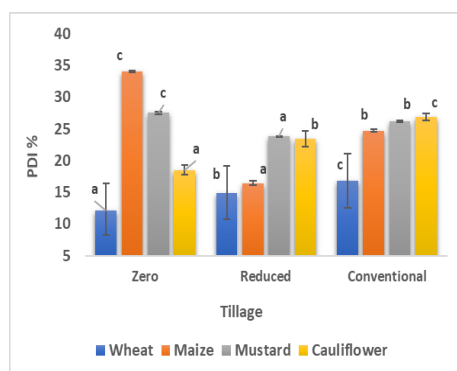
- Conservation Agriculture is defined as resource saving agricultural practices that promotes maintenance of a permanent soil cover, minimum soil disturbance and diversification of plant species.
- It helps to maintain a diverse community of organisms that help to control plant diseases, insect and weed populations; recycle soil nutrients; and improve soil structure with positive effects on water holding capacity, nutrient retention and supply and levels of organic carbon (FAO, 2021)
- Globally conservation agriculture (CA) is being practiced on about 180 M ha. (A. Kassam, *et al.* 2019)
- In India, CA adoption has expanded to cover about 1.5 M ha. (A. Kassam, *et al.* 2018)
- Farms practicing conservation farming averaged a 12.88% higher return per rupee of investment than conventional farms.

Treatment Details:

Nutrient Amendments	Description
NR1	0% residue 100% N.P.K.
NR2	100% residue + 50% N.P.K.
NR3	100% residue + 75% N.P.K.
NR4	50% residue + 100% N.P.K.
NR5	50% residue + 75% N.P.K.

Tillage	Description
CT	Conventional tillage
ZT	Zero tillage
RT	Reduced tillage

Varieties	Wheat	Maize	Mustard
V1	DBW-39	ADV-9293	TBM-204
V2	DBW-107	PAC-751	Bullet
V3	HD-2967	ADV-757	B9
V4	CBW 38	ADV-759	ADV-414
V5	DBW 187	PAC-741	B-54



* Alphabets indicate DMRT values; the same alphabetical sequence indicate DMRT mean comparisons according to the respective treatment.

Fig. 1: Effect of different tillage systems on the disease severity of the mentioned crops

Fig. 2: Effect of nutrient & residue combinations on the disease severity of the mentioned crops

Fig. 3: Effect of varieties on the disease severity of the mentioned crops

Results and Discussion:

- Severity of leaf blight disease complex of wheat incited by *Alternaria triticina* and *Bipolaris sorokiniana* was found minimum under zero tillage (AUDPC=357.26) followed by reduced tillage (AUDPC= 451.93) conditions with 50% residue + 100% N.P.K.(AUDPC= 395.96). In terms of varietal screening, HD-2967 (V3) (AUDPC= 366.42) performed the best followed by DBW-107 (V2) (AUDPC= 413.82)
- Reduced tillage (AUDPC=490.65) performed the best in terms of the least disease development of southern leaf blight of maize caused by *Bipolaris maydis* with 100% residue + 75% N.P.K. (AUDPC=652.75) Also, varietal differences showed ADV-759(V4) (AUDPC= 555.3) to be superior than the others.
- Zero tillage (AUDPC= 547.92) followed by reduced tillage (AUDPC= 719.85) showed the least progression of leaf spot disease of cauliflower caused by *Alternaria brassicicola*.
- In mustard, reduced tillage (AUDPC= 715.02) performed the best followed by conventional tillage (AUDPC= 781.98) with the best nutrient combination of 50% residue + 100% N.P.K.(AUDPC= 731.59) in managing the *Alternaria* blight disease caused by *Alternaria brassicae*. Among the varieties, Bullet (V2) (AUDPC=629.29) performed the best followed by TBM-204(V1) (AUDPC= 739.12)
- Similarly, in case of Phoma blight of potato caused by *Phoma andigena*, the best treatment showing least disease progression was in case of conventional tillage (AUDPC=629.83) followed by zero (AUDPC=743.97) and reduced tillage (AUDPC= 1018.68)

Conclusion:

- Not all diseases reacted the same way across the systems, but severity of few foliage diseases were found to be comparatively lesser under zero and reduced tillage management practices.
- It was clearly observed that more crop residues along with NPK fertilizers had negative effect on the progression of certain foliage diseases of the studied crops.
- Varietal choice also had significant effect on yield and foliage disease suppression under different tillage practices.
- More knowledge needs to be acquired on different host-pathogen systems, rhizosphere microbiome diversity and its impact on soil ecological services under different tillage system to further understand the microbial interactions with disease dynamics and yield.