Original Research Article

<https://doi.org/10.20546/ijcmas.2018.709.293>

Influence of Dates of Sowing on Incidence of Mungbean Yellow Mosaic Virus (MYMV) in Mungbean

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ABSTRACT

Mungbean is one of the most desired legume of vegetarians, its wide cultivation across many parts of Africa, South East Asia including India is driven by its huge demand across many parts of the world. However, its cultivation is suffering in all these regions due to Yellow Mosaic Disease (YMD) caused by *Mungbean yellow mosaic virus* (MYMV). Hence present investigation was carried out to understand the effect of date of sowing on incidence of MYMV in mungbean during *Kharif* 2016-17. Mungbean was sown at weekly interval of Standard Meteorological Week (SMW) starting from 22nd SMW up to 7 weeks. First sowing was done on 30th May (22nd SMW), followed by 6th June (23rd SMW), 13th June (24th SMW), 20th June (25th SMW), 4th July (27th SMW) and last was on 11th July (28th SMW). Observations on incidence of MYMV at each date of sowing and yield parameters recorded were subjected to statistical analysis. The results of revealed that, most suitable date of sowing with maximum yield parameters was 23rd SMW (6th June) which recorded least MYMV incidence of 4.85 per cent with highest of 9.32 pods/plant and seed yield of 1220 kg ha⁻¹, followed by 22nd SMW (30th May) sowing which recorded disease incidence of 6.84 per cent with 8.92 pods/plant and seed yield of 1093 kg ha⁻¹. The lowest yield parameters of 6 pods/plant and 112 kg ha⁻¹ seed yield was recorded in the plot sown on 28th SMW (11th July) with highest MYMV incidence of 15.15 per cent followed by 27th SMW (4th July) sown plot, which recorded on par of 6.2 pods/plant and 116 kg ha⁻¹ seed yield with incidence of 13.60 per cent. Hence from each date of sowing reveals the most suitable date of sowing for mungbean is 6th June (23rd SMW), which had lowest MYMV incidence and highest seed yield compared to others.

Keywords

Mungbean, MYMV, Kharif and Standard meteorological week

Article Info

Accepted:

16 August 2018

Available Online:

10 September 2018

Introduction

Mungbean [*Vigna radiata* (L.) Wilczek] also known as greengram. The crop is native to the Indian subcontinent and cultivated in other South East Asian countries such as Pakistan, Bangladesh, Sri Lanka, Philippines, Taiwan, Nepal, Thailand, Laos, Kampuchea, Vietnam,

Indonesia, Eastern Malaysia, Southern China and Java (Singh, 1991). Mungbean is grown principally for its protein rich edible seeds which are used for consumption by cooking, fermenting, milling or sprouting. Seeds are also used for making soups, curries, bread, sweets, noodles, salads, papad etc. (Singh *et al.*, 1988). It is one of the major sources of

protein, it contains isoflavonoids having estrogen and antioxidant activities useful in prevention of diseases such as cancer, it also exhibits antimicrobial and insecticidal activities (Sheteawi and Tawfit, 2007). Being a leguminous crop, it plays an important role in improving the soil fertility through biological nitrogen fixation (Asghar *et al.*, 2006), checks soil erosion as a cover crop, used as a green manure and fodder crop as well (Sahay *et al.*, 1999). Among many biotic stresses mungbean yellow mosaic disease caused by Mungbean Yellow Mosaic Virus (MYMV) is considered as a number one threat of mungbean, limiting the production and productivity. The virus is most destructive in Indian subcontinent and adjacent areas of South-East Asia causing 100 per cent yield losses. It causes severe disease and economic losses in mungbean by plummeting seed yield and quality (Kang *et al.*, 2005). Mungbean yellow mosaic virus belongs to the family Geminiviridae and genus begomovirus consisting of viruses with circular (20 x 30 nm), single-stranded (ss) DNA genome (Hull, 2004). Transmitted by whitefly (*Bemisia tabaci*) (Borah and Dasgupta, 2012). As mungbean is mainly grown in *kharif*, the present investigation focused on finding out suitable date of sowing to escape / avoid the incidence of MYMV in *kharif*.

Materials and Methods

This study was conducted during *kharif* 2016. Mungbean was sown at weekly interval starting from 22nd standard week (last week of may/1st week of June) up to 7 weeks. For each date of sowing, 5x3m plot was sown in three replications using Randomized Complete Block Design (RCBD). Normal agronomic practices, cultural operations and recommended package of practices were followed for all dates of sowing (treatments) till harvest. The observation on incidence of MYMV was recorded after the first

appearance of symptoms and at weekly intervals subsequently. Yield parameters like pods per plant, and seed yield were recorded at harvesting. The per cent disease incidence was calculated using following formula as mentioned below;

$$\text{Per cent Disease Incidence (PDI)} = \frac{\text{Number of plants infected}}{\text{Total number of plants observed}} \times 100$$

Results and Discussion

The observations on incidence of MYMV at each date of sowing and yield parameters recorded were subjected to statistical analysis and results revealed that, incidence of yellow mosaic caused by MYMV in mungbean sown at different dates of sowing appeared differently. The progression of disease in all the treatments followed similar trend. However, their final observation of disease incidence varied from 4.85 to 15.15 per cent. The 23rd SMW sowing (6th June) recorded lowest incidence of 4.85 per cent MYMV among all the other sowings followed by 6.84 per cent in 22nd SMW sowing (30th May) and 7.67 per cent at 25th SMW sowing (20th June) which was on par with 24th SMW sowing (13th June). The disease incidence had an increasing trend as the date of sowing was extended by each SMW. Highest MYMV incidence of 15.15 per cent was recorded in 28th SMW sown plot (11th July) followed by 13.60 per cent in 27th SMW sown plot (4th July) and 8.45 per cent in 26th SMW sown plot (27th June). Yield parameters recorded had a detrimental effect of dates of sowing, as sowing delayed concurrently the yield declined. The most suitable date of sowing with maximum yield parameters was 23rd SMW (6th June) which recorded the highest of 9.32 pods/plant and seed yield of 1220 kg ha⁻¹, followed by 22nd SMW (30th May) sowing which recorded 8.92 pods/plant and seed yield

of 1093 kg ha⁻¹ (Table 1). Yield parameters declined along with increasing trend of disease incidence as the sowing was delayed by weekly intervals (Fig. 1). The lowest yield parameters of 6 pods/plant and 112 kg ha⁻¹ seed yield was recorded in the plot sown on 28th SMW (11th July) followed by 27th SMW (4th July) sown plot, which recorded on par of 6.2 pods/plant and 116 kg ha⁻¹ seed yield. The final outcome of each date of sowing reveals the most suitable date of sowing for mungbean is 6th June (23rd SMW), which had lowest MYMV incidence and highest seed yield compared to others.

This indicates that mungbean sown on June 6th completes its physiological life cycle (vegetative and reproductive phase) at proper time with lower incidence of MYMV and higher yield. Whereas, decreased disease incidence was due to unfavorable weather

conditions like regular showers which interfered with growth and multiplication of whitefly population and hence transmission of MYMV by the vectors was avoided indirectly helped in reducing the total disease incidence.

Our findings were in accordance to a previous study wherein, low incidence of MYMV was observed in early June sown crop compared to July or August sown crops (Rathi and Vijay Veer Singh, 2005). The yield obtained was also higher (1220 kg ha⁻¹) in 6th June (23rd SMW) sown crop compared to rest of the dates of sowing and lowest (112 kg ha⁻¹) was in last date of sowing (11th June (28th SMW). The other factors which may add to the yield losses in farmers' field due to delayed sowing are incidence of powdery mildew, anthracnose, bacterial blight and pod fly insect. Their combined effect makes the crop risky among the growers.

Fig.1 Terminal incidence of MYMV and mungbean yield influenced by Different weeks of sowing

Table.1 Influence date of sowing on incidence of MYMV in mungbean and at its yield parameters during *kharif* 2016

Treatment	Date of sowing	SMW	Per cent Disease Incidence (%)							Pods per plant	Yield (kg ha ⁻¹)
			36 DAS	43 DAS	50 DAS	57 DAS	64 DAS	71 DAS	78 DAS		
T1	30/05/16	22 nd	1.18 (6.24)	2.90 (9.81)	5.06 (13.00)	6.45 (14.71)	6.61 (14.90)	6.59 (14.87)	6.84 (15.16)	8.925 (17.38)	1093.33
T2	06/06/16	23 rd	0.98 (5.69)	2.75 (9.55)	3.62 (10.97)	4.01 (11.56)	4.41 (12.12)	4.75 (12.59)	4.85 (12.72)	9.325 (17.77)	1220.00
T3	13/06/16	24 th	4.97 (12.88)	6.50 (14.76)	7.17 (15.53)	7.32 (15.70)	7.47 (15.86)	7.56 (15.96)	7.95 (16.37)	9.225 (17.02)	634.00
T4	20/06/16	25 th	2.65 (9.37)	2.90 (9.81)	3.86 (11.33)	3.91 (11.41)	4.61 (12.40)	7.22 (15.59)	7.67 (16.08)	8.575 (17.02)	718.66
T5	27/06/16	26 th	0.64 (4.61)	3.55 (10.87)	3.84 (11.31)	3.99 (11.53)	5.38 (13.42)	6.60 (14.88)	8.45 (16.90)	7.700 (16.10)	336.00
T6	04/07/16	27 th	4.68 (12.50)	5.32 (13.33)	5.77 (13.89)	8.35 (16.79)	9.77 (18.21)	10.81 (19.19)	13.60 (21.64)	6.200 (14.41)	116.00
T7	11/07/16	28 th	5.61 (13.70)	5.90 (14.06)	9.35 (17.80)	10.64 (19.03)	11.13 (19.48)	12.01 (20.28)	15.15 (22.90)	6.000 (14.17)	112.00
S.Em ±			0.22	0.29	0.33	0.39	0.51	0.57	0.68	0.33	
CD at 5 %			0.68	0.88	1.02	1.21	1.58	1.75	2.09	1.01	
CV			14.94	13.43	11.95	12.27	14.54	14.33	14.70	8.22	

* DAS: Days After Sowing; SMW: Standard Meteorological Week

Nay *et al.*, (2008) reported minimum infection of MYMV when mungbean was sown in June, July, August and September. Maximum incidence was observed in February, March and April sown crop in Yezin region of Myanmar, thereby indicating that drier period during the months of February to June could help in whitefly build which was noticed in our surveillance study. Subsequent reduction in disease incidence was due to onset of rains detrimental to whitefly population. Rashid *et al.*, (2013) reported that among January-15, February-1, February-15, March-1, March-15 and April-1 sown crops, March 1st sown crop showed minimum disease incidence (13- 26 %) with higher yield (2131 kg ha⁻¹). Mahalakshmi *et al.*, (2014) studied the effect of date of sowing on incidence of MYMV in blackgram. Sowing was done from June to April at 15 days interval. Among these sowings, June, July and October sown plots showed lesser incidence of MYMV compared to other dates of sowing due to frequent rainfall during the *kharif* season. However, they noticed maximum disease incidence and whitefly population during summer crop which indicates positive correlation of maximum temperature with whitefly and MYMV incidence and supports our findings beyond doubt. Naveed *et al.*, (2015) also studied effect of eight different dates of sowing (May 26th, June 2nd, June 9th, June 16th, June 23rd, June 30th, July 7th and July 14th) on incidence of MYMV and lowest incidence with highest yield (1990 kg ha⁻¹) was observed in June 2nd sown crop. Highest incidence and lowest yield was observed in July 14th sown crop. The findings of our study advocate June first week is most suitable date for sowing of mungbean, which will avoid incidence of MYMV with higher yield.

The experiment on effect of date of sowing on MYMV incidence conducted during *kharif* showed that, ideal date of sowing for

mungbean is 6th June (23rd SMW), which had lowest MYMV incidence and highest seed yield. Date of sowing had direct impact on incidence of MYMV, the experimental results concludes that early sowing of mungbean can escape the disease incidence and delayed sowing leads to higher disease incidence with lower yields. Hence, sowing of greengram can be recommended during first week of June (*kharif*).

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How to cite this article:

Meghashree Meti and Mallikarjun Kenganal. 2018. Influence of Dates of Sowing on Incidence of Mungbean Yellow Mosaic Virus (MYMV) in Mungbean. *Int.J.Curr.Microbiol.App.Sci*. 7(09): 2362-2367. doi: <https://doi.org/10.20546/ijcmas.2018.709.293>