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# Status of the Mung Bean Yellow Mosaic Virus (MYMV) Disease in Southern Karnataka

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**ABSTRACT**

*Roving survey was carried out to record the incidence of mung bean yellow mosaic virus disease in four major mung bean growing districts viz., Tumakuru, Chamarajanagar, Hassan and Chitradurga of Southern Karnataka. Survey results revealed that MYMV was present in all the fields visited in Tumakuru, Chamarajanagar, Hassan and Chitradurga districts. Disease incidence ranged from 0- 58.26 per cent and maximum incidence was in Tumakuru (58.26 %) followed by Hassan (55.13%), Chamarajanagar (52.79%) and least incidence was in Chitradurga (46.95%) district during karif 2015. Highest incidence of MYMV disease was recorded on sole crop compared to intercrop. Vector Bemisia tabaci population per trifoliate leaves was highest in Tumakuru district. A positive correlation between incidence and vector population was also observed.*

***Key words:*** *Mung bean, MYMV, Survey, Incidence etc.*

## INTRODUCTION

Mung bean (*Vigna radiata* L.) has many common names, *viz.*, mung, moong, mungo and greengram. In India, the name greengram is more commonly used than mung bean[3]. It is third most important pulse crop of India after chickpea and pigeonpea and native to the Indian subcontinent, the mung bean is mainly cultivated in India, China and Southeast Asia.

In India, this crop is cultivated in three different seasons' *viz*., *kharif* (July- Oct), *rabi* (Sept- Dec) and summer (March- June). It is grown under rainfed condition during *kharif* and on residual moisture during *rabi* in eastern and southern part of the country. However maximum area of its cultivation is under *kharif*, where intercropping with sorghum, pearl-millet, maize, cotton, castor, pigeonpea etc., are popular.

In India, mung bean is growing in an area of 3.42 lakh ha and production of 1.03 lakh tonnes with productivity of 302 kg/ha. Important mung bean growing states are Rajasthan, Maharashtra, Karnataka, Andhra Pradesh, Odisha, Tamil Nadu and Uttar Pradesh[1].

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In Karnataka, mung bean is cultivating in an area of 1.69 lakh ha with a production of 51,289 tonnes and productivity of 319 kg/ha during 2012-13 which is very low as compared to country's average. Bidar district occupies first position with a total production of 26,387 tonnes, followed by Kalaburagi, Yadgir, Chamarajanagar and Chitradurga[1].

MYMV disease is one of the most important virus diseases on greengram transmitted by whitefly (*Bemisia tabaci* Genn.). It was first reported by Nariani[7] at IARI, New Delhi with 20-30 per cent incidence at institute areas. In this view, Manjunath *et al*[5]., conducted survey of major mung bean growing areas of Southern Karnataka indicated the occurrence of disease ranging from 31.49 to 100 per cent. The highest average incidence (79.54%) was recorded in Tumakuru district followed by Chikkamagaluru (59.73%), Hassan (56.57%), Shivamogga (56.71%), Mysuru (51.88%), Davanagere (51.09%), Chitradurga (48.11%) and Mandya district (45.58%). Although, areas under cultivation of mung bean more in North Karnataka, recently there was more MYMV incidence reported from southern Karnataka. The objective of present investigation was focused on status of MYMV in southern districts of Karnataka.

## MATERIALS AND METHODS

Survey was carried out to assess the mung bean yellow mosaic virus disease incidence in major mung bean growing areas of Southern Karnataka namely Tuamakuru, Hassan, Chamarajanagar and Chitradurga district during 2015-16. The diagnosis of the disease in the field was based on symptoms on the plants. The per cent disease incidence was calculated randomly in different locations in an area of 5×5 m in the field by counting the number of plants infected out of total number of plants examined in each sector using the formula given below. The observation on stage of the crop, area, varieties grown, symptoms, presence of whitefly and cropping system followed were also recorded.

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

## RESULTS AND DISCUSSION

A roving survey was conducted in four districts *viz.*, Tumakuru, Chamarajanagar, Hassan and Chitradurga to know the mung bean yellow mosaic virus disease incidence, varieties grown, stage of the crop, area, symptoms and presence of whitefly in different mung bean growing areas of southern Karnataka during 2015-16.

The diagnosis of the disease in the field was based on symptoms (Plate 3). The per cent disease incidence was calculated randomly in different locations. The results of the survey conducted during 2015-16 are presented in Table 1.

**District wise MYMV incidence:**

**Tumakuru district:**

Major mung bean growing areas include 2 taluks *viz*., Tiptur and Turuvekere. In Tiptur taluk, Mattihalli, Nagatihalli, Luckyhali, Shivaramana halli, Vonnavalli, Putralli villages, the crop was surveyed for MYMV incidence. Minimum incidence of 12 per cent was recorded in Nagatihalli village on the local variety and maximum incidence of 75.58 per cent was recorded in Putralli village of Tiptur. In Turuvekere taluk, minimum disease incidence of 56.60 per cent and maximum of 97.00 per cent was recorded on local cultivars in Aralikere and Madhihalli, respectively. Average incidence of 52.84 per cent was recorded in Tumakuru district with the range of 12 to 97 per cent (Table.2). Least incidence was recorded in Puttamadhihalli village (Table 1).

**Chitradurga district:**

Maximum mung bean growing was found in three taluks *viz*., Hosadurga, Challikere and Holalkere. Maximum and minimum incidence of 56.21 and 32.27 per cent respectively was

recorded in Horake and Kengunte villages of Holalkere taluk. 50 % incidence observed in Chikkajajuru Village. In Hosadurga taluk, minimum incidence of 42.23 per cent was recorded in Masanihalli village (Table 1). Crop in other two villages such Mahalakshmipura, Yalakappanahatti recorded 45.51 and 50.10 per cent incidence respectively. In Challikere taluk, disease incidence was highest with 50.12 per cent in Talaku village and lowest incidence with 49.23 per cent in Valase village. In Chitradurga district, MYMV incidence ranged from 32.27 to 56.21 per cent with an average of 46.95 per cent. It is also found that maximum crop was under sole crop.

**Hassan district:**

Survey was conducted in Arkalgud, Channnarayapatna, Arsikere taluks were mung bean area is more compared to other taluks of Hassan. In Arkalgud taluk, among Honnavalli, Baichanahalli, Kasaba village's maximum incidence of 70.65 per cent was recorded in Baichanahalli village (70.65%). Minimum incidence of 45.00 per cent was recorded in Bisalehalli of Arasikere taluk. Kanihalli recorded 60.65 % of MYMV incidence.

In Channnarayapatna taluk, maximum disease incidence was recorded in Thimmalapura village with 60.00 per cent and minimum incidence with 54.07 per cent in Alisandra village. Average of 55.09 per cent MYMV incidence with the range of 45 to 70.65 per cent was recorded in Hassan district (Table 2). Sole crop was predominated. Along with MYMV, powdery mildew was the noticeable disease during survey.

**Chamarajanagar district:**

In Chamarajanagar district mungbean was surveyed in two taluks *viz*., Chamarajanagar and Kollegala. In former taluk, least incidence of 49.23 per cent was recorded in Uthavalli village on the local variety and maximum incidence of 50.12 per cent was recorded in Shivapura village. Nagavalli and Mallayana pura villages other major mung bean areas were found incidence of MYMV (Table 1). Later in Kollegala taluk, disease incidence of 56.10 per cent and 55.12 per cent was recorded on China mung and local cultivars in Maduvanahalli and Sattengala villages respectively. Average incidence of 52.79 per cent was recorded in Chamarajanagar district with the range of 49.23 to 56.21 per cent.

In conclusion, maximum MYMV disease incidence was recorded in Tumakuru (58.26%) followed by Hassan (55.13%) Chamarajanagar (52.79%) and Chitradurga (46.95%). Among the varieties grown local varieties occupied more area followed by Pusa- baisaki and China mung in these 4 districts (Table.2 and Fig.1). However, all varieties found susceptible to MYMV infection.

It was noticed that crop infected at early stage suffered more with severe symptoms and exhibiting mosaic, complete yellowing and reduction in leaf size. In severly infected leaves, the green areas become raised, thick, leathery and showing puckering symptom.

During survey, it was also observed the influence of cropping system on the incidence of MYMV. Results found that, in four districts surveyed, the average per cent disease incidence in sole crop was 47.26 per cent, comparatively more than that the intercrop (40.21 per cent) (Fig.2). Similar trend was observed for vector population, where the average vector population recorded on sole crop is 2.73 per plant as compared to 1.39 per plant in intercrop (Table.3 and Fig.3). In Karnataka, mung bean is grown as sole crop as well as intercrop with pigeonpea, Black gram, Sorghum, field bean, cowpea *etc*., Invariably whiteflies were found feeding on most of the fields surveyed along with jassids, thrips, pod borers and pulse beetles in some of the field.

Similar types of surveys were earlier documented by Nariani[7], Nene[9], Bansal *et al*[2]., Singh *et al*[14]., Pathak and Jhamaria[11], Salam[13], Panduranga *et al*[10]., Paul *et al*[12]., and Kumar *et al*[4].

The variation in disease could be because of variation in temperature and relative humidity that might have direct influence on vector population and its migration. Similar effect of climate on vector population was earlier reported by Singh and Gurha[15] and Nath and Saikia[8].

Mung bean is cultivated both as sole crop and intercrop. In most of the surveyed locations, MYMV incidence was more on sole crop than intercrop as it presented in results. It was similar with vector population where maximum vector per plant was recorded in sole crop while minimum number observed in intercrop. It was also observed that significant positive correlation between per cent disease incidence and whitefly population. Similar results were earlier published by Murugesan and Chelliah[6].

In the entire mung bean fields surveyed, infected plants exhibited irregular yellow and green patches on trifoliate leaves, puckering, reduction leaf size, complete yellowing and bare peduncle with stunted internodes bearing few flowers. Similar symptoms were observed by Salam[13] in whitefly inoculated mung bean plants under glass house conditions. These symptoms are in conformity with those described by Nariani[7].

In every infected fields surveyed whiteflies population found invariably. However, jassids, thrips and pod borers were the other insects also noticed. These type results were also recorded by Salam[13].

**Table 1: MYMV disease incidence and its vector whitefly population in green gram growing areas of Southern Karnataka during 2015**

| Sl. No. | Districts | Taluks | Villages | Varieties | Disease incidence (%) | Whitefly adults / 1st trifoliate leaves | Cropping pattern |
|---|---|---|---|---|---|---|---|
| 1. | TUMKUR | Tiptur | Mattihalli | Local | 16.67 | 2.0 | Intercrop |
| | | | Nagatihalli | Local | 12.00 | 1.1 | Intercrop |
| | | | Luckyhali | China mung | 60.00 | 1.2 | *Sole crop |
| | | | Shivaramana halli | China mung | 50.12 | 2.2 | Sole crop |
| | | | Vonnavalli | Local | 70.17 | 1.3 | Sole crop |
| | | | Putralli | Local | 75.58 | 1.7 | Sole crop |
| | | Turuvekere | Aralikere | Local | 56.60 | 1.5 | Sole crop |
| | | | Madhihalli | Local | 97.00 | 2.6 | *Sole crop |
| | | | Puttamadhihalli | Local | 86.21 | 2.0 | Sole crop |
| 2. | CHITRADURGA | Hosadurga | Mahalakshmipura | Local | 45.51 | 2.3 | *Sole crop |
| | | | Masanihalli | China mung | 42.23 | 1.3 | Sole crop |
| | | | Yalakappanahatti | Local | 50.10 | 2.0 | Inter crop |
| | | Challikere | Talaku | Local | 50.12 | 2.0 | Sole crop |
| | | | Valase | China mung | 49.23 | 1.1 | Inter crop |
| | | Holalkere | Horake | Local | 56.21 | 1.3 | Sole crop |
| | | | Chikkajajuru | Local | 50.00 | 1.1 | Inter crop |
| | | | Kengunte | Pusa baisaki | 32.27 | 1.5 | Sole crop |
| 3. | CHAMARAJANAGAR | Chamarajanagar | Shivapura | Local | 50.12 | 2.0 | Sole crop |
| | | | Uthavalli | Local | 49.23 | 1.1 | Inter crop |
| | | | Nagavalli | China mung | 56.21 | 2.3 | *Sole crop |
| | | | Mallayana pura | Local | 50.00 | 1.1 | Inter crop |
| | | Kollegala | Sattengala | Local | 55.12 | 3.1 | Sole crop |
| | | | Maduvanahalli | China mung | 56.10 | 2.1 | *Inter crop |
| 4. | HASSAN | Arsikere | Bisalehalli | Local | 45.00 | 1.2 | Inter crop |
| | | | Kanihalli | Local | 60.65 | 2.3 | *Sole crop |
| | | Channnarayapatna | Thimmalapura | Local | 60.00 | 2.1 | Sole crop |
| | | | Alisandra | Local | 54.07 | 2.0 | Sole crop |
| | | Arkalgud | Honnavalli | China mung | 45.00 | 1.2 | *Inter crop |
| | | | Baichanahalli | China mung | 70.65 | 2.3 | Sole crop |
| | | | Kasaba | Local | 50.55 | 1.3 | Sole crop |

* Powdery mildew disease observed.

**Table 2: Incidence of MYMV disease in mungbean growing districts of Southern Karnataka during 2015**

| Sl. No. | Districts | No. of taluks | No. of locations | Disease incidence (%) (Range) | Disease incidence (%) (Average) | Varieties commonly grown | Disease reaction |
|---|---|---|---|---|---|---|---|
| 1 | Tumakuru | 2 | 9 | 12.00- 97.00 | 58.26 | China mung , Local | Yellow mosaic, yellowing, reduced leaf size |
| 2 | Chitradurga | 3 | 8 | 32.27- 56.21 | 46.95 | Local , China mung Pusa baisaki | Yellow mosaic, yellowing, reduced leaf size |
| 3 | Chamarajanagar | 2 | 5 | 49.23- 56.21 | 52.79 | China mung , Local | Yellow mosaic, yellowing, reduced leaf size |
| 4 | Hassan | 3 | 7 | 45.00- 70.65 | 55.13 | China mung , Local | Yellow mosaic, yellowing, reduced leaf size |

* No. of locations, **No. of whiteflies per trifoliate leaves

**Table 3: Influence of cropping system on the incidence of MYMV disease and its vector in mungbean growing farmers' fields during 2015**

| Sl. No. | Locations/ districts | Per cent disease incidence | | Vector population** | |
|---|---|---|---|---|---|
| | | Sole crop | Inter crop | Sole crop | Inter crop |
| 1 | Tumakuru | 70.81(7) * | 14.33(2) | 1.78 | 1.55 |
| 2 | Hassan | 59.18(5) | 45.00(2) | 5 | 1.2 |
| 3 | Chamarajanagar | 53.81(3) | 51.77(3) | 2.46 | 1.43 |
| 4 | Chitradurga | 45.26(5) | 49.77(3) | 1.68 | 1.40 |
| | **Total** | **47.26** | **40.21** | **2.73** | **1.39** |

***No. of locations, **No. of whiteflies per trifoliate leaf

**Plate 3: Field view of MYMV disease incidence in different locations**

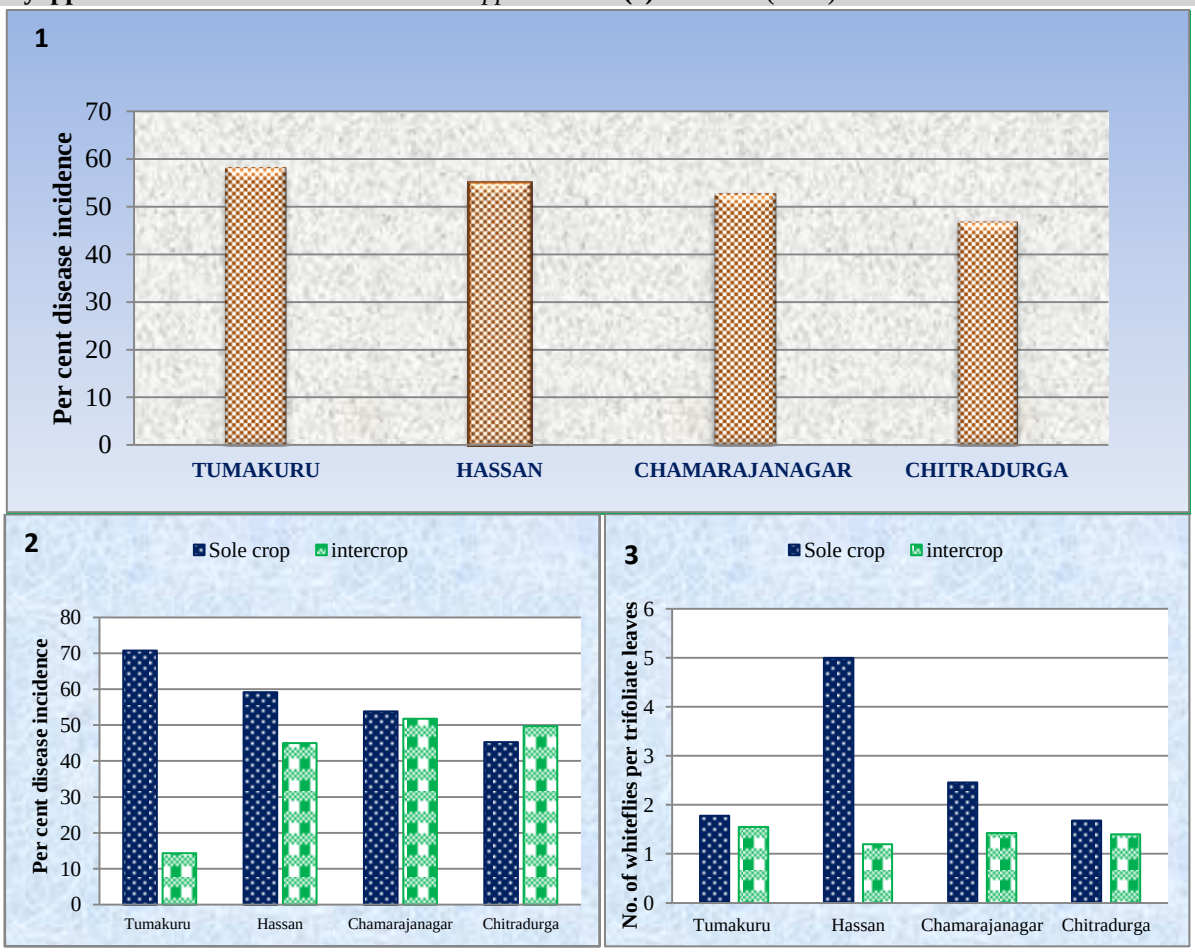


**Fig. 1: Incidence of MYMV in Mung bean growing districts of Southern Karnataka, Fig. 2: Effect of cropping system on the incidence of MYMV in farmer's field, Fig. 3: Effect of cropping system on whitefly population in farmer's field.**

## CONCLUSION

Maximum MYMV incidence was recorded in Tumakuru (58.26 %) followed by Hassan (55.13%), Chamarajanagar (52.79%) and least incidence was in Chitradurga (46.95%) district during *karif* 2015. Highest incidence of MYMV disease was recorded on sole crop compared to intercrop. Vector *B. tabaci* population per trifoliate leaves was highest in Tumakuru district. A positive correlation between incidence and vector population was also observed.

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