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Ministry of Agriculture, Cooperation & Farmers' Welfare
Department of Agriculture, Cooperation & Farmers' Welfare
Government of India
(Oilseeds Division)

Krishi Bhawan, New Delhi
Dated: 7th June, 2016

To

Commissioner / Director of Agriculture
Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Karnataka,Madhya Pradesh, Maharashtra, Nagaland, Odisha, Rajasthan, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand.

Subject: Advisory for the Management of White Fly and Yellow Mosaic Virus in Soybean – reg.

Sir/Madam

As a follow-up of the suggestions/recommendations of the National Workshop on "Selection of resistant variety of soybean against yellow mosaic and other biotic and abiotic stresses" held at ICAR-Indian Institute of Soybean Research, Indore in February, 2016, an Advisory on the Management of White Fly and Yellow Mosaic Virus in Soybean has been developed based on inputs provided by ICAR-IISR, Indore. A copy of the advisory is enclosed for immediate circulation among the farmers, State Department officials and other related agencies of your state. This may please be treated as **Most Urgent**.

Yours faithfully

Encl. As above.

(Anupam Barik)
Addl. Commissioner (Oilseeds)

Copy for information to:

1. PPS to Agriculture Commissioner, DAC&FW, Krishi Bhawan
2. CMD/MD, NSC, HIL, KRIBHCO, NAFED, IFFDC, SFAC
3. PPS to Joint Secretary (Oilseeds), DAC&FW, Krishi Bhawan
4. ADG (O&P), ICAR, Krishi Bhawan
5. Director, ICAR- IISR, Khandwa Road, Indore-452001, MP
6. Director, DOD, Himayat Nagar, Hyderabad, AP
7. Copy also to: DD(OS)/AD(OS)/Consultants (OS)/Programmer-for uploading the same along with BMP in the NMOOP website.

Advisory for the Management of White Fly and Yellow Mosaic Virus in Soybean

1. Regular awareness and trainings to the farmers as a mass campaign be conducted.
2. Monitoring and management of white fly on alternate hosts like summer moong etc.
3. Use of resistant varieties viz. PS 1042, PS 1347, PS 1368, PS 1092, PS 1225, Pusa 97 & Pusa 12 for Northern Plain zone; JS 20-29, JS 20-69, JS 97-52 & RKS 24 for Central zone; PS 1029 for Southern zone and JS 97-52 for North Eastern zone.
4. Ensure timely sowing of crop e.g. 15-30 June for North Eastern & Southern zone; 20 June-5 July for Northern Plain and Central zone.
5. Optimum plant population with 60-75 kg/ha seed rate and 45x5 cm spacing.
6. Seed treatment with recommended fungicide followed by treatment with Thiamethoxam 30 FS @10 ml/kg seed or Imidacloprid 48 FS @1.24 ml/kg seed and inoculation.
7. Apply recommended dose of fertilizer and FYM for good crop growth.
8. Keep the field weed free upto 45 days after sowing.
9. Removal and destruction of infested plants showing YMV symptoms.
10. Spray on standing crop with recommended chemical e.g. Thiamethoxam 25 WG @100 g/500 litre water/ha at the appearance of symptoms.
11. Use of yellow sticky traps (20-25 traps/ha) to trap adult white fly.

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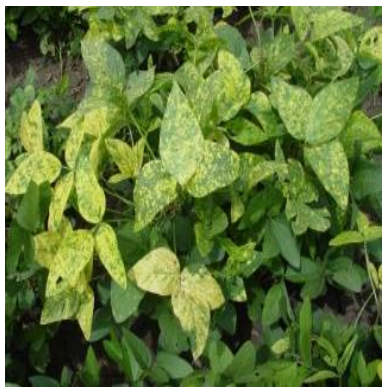
Management of White Fly Transmitted Yellow Mosaic Virus in Soybean and Package of Good Practices

White fly: It is a serious insect-pest of soybean in northern region (Delhi, Punjab and Haryana). The nymphs and the adults not only suck the plant sap but also transmit yellow mosaic virus causing YMV disease in soybean. Feeding by white fly results in pre-mature drying of leaves. It also secretes honey-dew which gets deposited on the lower leaves. Sooty mould develops on honey-dew deposited leaves.

White fly of soybean

Yellow Mosaic Virus: This disease was prevalent in Himachal Pradesh, Delhi, Punjab, Haryana, and parts of M.P. However, during recent years it is heavily infested on soybean crop prevalent in Central Zone covering Madhya Pradesh, Maharashtra and Rajasthan leading to heavy losses to farmers. This disease is virus transmitted and has a wide host range which includes pulses and weeds. It causes 15-75% yield loss.



Yellow mosaic virus in soybean

Symptoms: Yellow spots are either scattered or produced in indefinite bands along the major veins of soybean leaves. Rusty necrotic spots appear in the yellow areas as the leaves mature. Some time severe mottling and crinkling of leaves are also seen. Leaves of severely infected

plants become yellow when they are young. Affected plants bear less flower and pods. The infection results in decrease in oil and increase in protein content. The virus is sap transmitted and spread by white fly *Bemesia tabaci*.

IPM Module for Management of White fly and Yellow Mosaic Virus in Soybean

1. **Optimum sowing time:** After the onset of monsoon. However middle of June to first week of July is the optimum time of sowing.
2. **Seed treatment: B**efore sowing, treat the seed with Thiamethoxam 30 FS @ 10ml/kg seed or Imidacloprid 48 FS @ 1.25 ml/kg seed followed by seed inoculation.
3. **Use of recommended seed rate, spacing and fertilizers**: Higher seed rate results in more densely populated soybean crop which attracts more insects. Further, it promotes lodging resulting in yield loss. Hence, farmers are advised to check the germination percentage of their seed before sowing and accordingly use seed rate (60-80 kg/ha) depending on seed size with recommended spacing (45 cm x 5cm).
4. **Identification, removal and destruction of infested plants from the field: P**lants showing symptoms of YMV should be removed from the field to prevent further spread of the disease.
5. **Use of recommended chemicals at right time:** For white fly management in standing crop, as soon as the symptoms appear, spray the crop with Thiamethoxam 25WG @ 100g/500 lit water/ha.
6. **Yellow sticky traps:** Use of yellow sticky traps (20-25 traps/ha) to trap the flying adults of white fly helps to minimize the losses due to disease.
7. **Quantity of water for spray solution**: Soybean requires 500 lit spray solution per ha with knapsack sprayer and 120 lit/ha with power sprayer. Spraying with less quantity will not give desired results
8. **Use of resistant/tolerant varieties:** Given in table below.
9.

Zone	States	Varieties
Northern Plain	Punjab, Haryana, Delhi, Eastern plains of Uttar Pradesh, Plains of Uttarakhand and Eastern Bihar	PS 1042, PS 1347, PS 1368, PS 1092, PS 1225, Pusa 97-12, Pusa 12
Central	Madhya Pradesh, Bundelkhand region of Uttar Pradesh, Rajasthan, Gujarat, North-West region of Maharashtra and Orissa	JS 20-29, JS 20-69 JS 97-52, RKS 24,
Southern	Karnataka, Tamil Nadu, Southern part of Kerala and Maharashtra	PS 1029
North Eastern	Assam, West Bengal, Bihar, Chhattisgarh, Meghalaya, Manipur and Nagaland	JS 97-52

Good Management Practices

1. Once in three years, deep summer ploughing should be done. This facilitates exposing the hibernating insects to extreme heat and predatory birds. It is also important to maintain soil health. Hence, farmers are advised to incorporate organic manure (well decomposed FYM @ 5-10 t/ha or Poultry Manure @ 2.5 t/ha) at the time of land preparation.

2. During past few years, soybean yields have been adversely affected across the country because of adverse climatic conditions (Uncertainties/ unpredictable on set of monsoon/heavy storms and long dry spells). Considering these, farmers are advised to use BBF or Ridge and Furrow methods for soybean planting in order to mitigate the climatic adversities.

3. In order to avoid risk of yield reduction due to aberrant climatic situations, farmers are recommended to grow 3-4 soybean varieties with varying maturity periods (Varietal Cafeteria Approach) in their fields. Different varieties possess resistance/tolerance to particular insect-pest and diseases. As they mature at different time, it gives convenience for the farmers during harvesting and threshing too.

4. Soybean is considered to be moderately exhaustive crop. Balanced nutrients application ensures better yield performance of soybean. The integration of 5-10 t Farm Yard Manure or 2.5 t poultry manure/ha along with the basal application of 20:60:40:20 $N:P_2O_5:K_2O:S$ generally provides balanced nutrition for harnessing the yield potential of soybean.

5. Seed treatment is very important operation in soybean considering number of fungal, bacterial and viral diseases which causes considerable reduction in plant population and thereby yield. Hence, farmers are advised to treat soybean seed at the time of sowing using 2 g Thiram +1g Carbendazim per kg seed. They can also use mixed combination of Carboxin 37.5 % + Thiram 37.5 % per kg seed or *Trichoderma viride* @ 8-10 g/kg seed.

6. Once the seed treatment with fungicides is done, farmers are advised to inoculate the treated seed with bio-inoculants like *Bradyrhizobium japonicum* and Phosphate Solubilizing Micro-organisms (PSM) each @ 5 g/kg seed immediately before sowing. If the soybean is grown in non-traditional/new area, they should increase the quantity to at least 10 g/kg seed.

7. **Optimum sowing Time, Spacing and Seed rate**

Zone	Sowing time	Seed rate (kg/ha)	Row spacing (cm)
North East	15th June - 30th June	55-60	45
North Plain	20th June - 5th July	65-70	45
Central	20th June-5th July	65-70	45
Southern	15th June-30th June	65-70	30

8. Intercropping of soybean with suitable companion crop is found to be remunerative compared to sole cropping. In rainfed areas where only one crop is possible, it is recommended that soybean should be intercropped with pigeonpea. Similarly, under irrigated situations, it can be intercropped with maize, sorghum, cotton, pearl millet, and finger millet so that it does not interfere with the next *rabi* crop. Soybean can also be successfully planted on the bunds of paddy fields for additional income.

9. Soybean is, by and large, grown as a rainfed crop during *kharif* season. Since last few years the distribution of rainfall was found to be uneven and erratic. Long dry spells, particularly during critical growth stages like seedling, flowering and pod fill affect the yield adversely. Hence, farmers are advised to apply life saving irrigation during these critical stages in order to sustain yield levels.

10. The soybean crop should be weed free at least till 45 days after sowing (DAS). The priority-wise agronomic practices for this include two manual weeding (20 and 40 DAS) or inter cultivation (Hand hoe/*Dora*/*Kulpa*). If it is not feasible due to continuous rains, farmers are advised to use variety of recommended herbicides as per their choice, suitability and availability. **Pre-emergence herbicides** (Metalochlor 50 EC @ 2.00 l/ha or Chlomozone 50 EC @ 2.00 l/ha or Pendimethalin 30 EC @ 3.25 l/ha or Diclosulum 84 WDG @ 26 g/ha). **Post-emergence herbicide suitable after 10-12 days after sowing** (Chlorimuron ethyl @ 36 g/ha); and **POE suitable after 15-20 DAS** (Imazethapyr 10 EC @ 1.00 l/ha or Quizalofop-ethyl 50 EC @ 1 l/ha or Quizalofop -p-tefuryl 4.41 EC @ 1 l/ha or Fenoxaprop-p- ethyl 9 EC @ 1 l/ha).

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