*The Andhra Agric. J* 69 (2): 250-263, 2022

# Survey for Incidence of Viral Diseases Infecting Groundnut (*Arachis hypogaea* L.) in Guntur and Prakasam Districts of Andhra Pradesh

**P Tejaswini, V Manoj Kumar, P Anil Kumar and D V Sai Ram Kumar**

Department of Plant Pathology, Agricultural College, Bapatla, A. P.

**ABSTRACT**

Roving survey was conducted for assessing the incidence of viral diseases infecting groundnut in two major groundnut growing districts of Andhra Pradesh *viz.,* Guntur and Prakasam which falls under Krishna zone during *kharif* and *rabi* 2020-21 where, groundnut bud necrosis disease (GBND) caused by *Groundnut bud necrosis virus* (GBNV) and peanut stem necrosis disease (PSND) caused by *Tobacco streak virus* (TSV) were observed. Incidence of GBND was significantly higher in *rabi* 2020-21 (7.03%) compared to *kharif* 2020-21 (1.82%) whereas, PSND incidence was significantly higher in *kharif* 2020-21 (4.52%) compared to *rabi* 2020-21 (0.28%). Maximum mean GBND incidence was recorded from Bapatla-West (4.6%) (Bapatla) and Maruproluvaripalem (12.45%) (Bapatla) whereas, maximum mean PSND incidence was recorded from Yazali (11.5%) (Karlapalem) and Madhamanchipadu (1.75%) (Vinukonda) during *kharif* and *rabi* 2020-21 respectively.

**Keywords:** *GBND, Guntur, Incidence, Kharif, PSND, Prakasam, Rabi and Survey.*

Groundnut (*Arachis hypogaea* L.) is an important annual oilseed and food legume crop grown throughout the world. It ranks 6$^{th}$ among the oilseed crops and 13$^{th}$ among the food crops of the world (Swaroopa *et al.,* 2018). China is the world's largest groundnut producing country followed by India where India accounts for 13 per cent of world production and ranks second in production with 6.7 million MT of shell groundnuts (United States Department of Agriculture, 2020). In India, major groundnut growing states are Gujarat, Tamil Nadu, Andhra Pradesh, Karnataka and Rajasthan accounting for about 78 % of total production. In India, the leading states of groundnut production are Gujarat, followed by Tamil Nadu, Andhra Pradesh (A.P.), Karnataka and Rajasthan contributing 37 %, 14 %, 12 %, 8 % and 7 % respectively to the total production (United States Department of Agriculture, 2020), (Fig. 2.2). In India, A.P. cultivates groundnut in an area of 5.37 lakh ha with 6.42 lakh ton production (2019-20) (APEDA).

Sometimes, low yields were reported in groundnut because of numerous diseases caused by fungi, bacteria, viruses and nematodes (Sreenivasulu *et al.,* 2008). Its productivity is influenced by several abiotic and biotic stresses, which include poor soil fertility and virus diseases (Darvin *et al.,* 2018). Among these, the diseases caused by viruses are of utmost importance in groundnut production. GBND caused by *GBNV* and PSND caused by *TSV* are important diseases of groundnut as they were estimated to cause an annual loss of US $ 89 million (Reddy *et al.,* 1995) and US $ 65 million (Reddy *et al.,* 2002). Incidence of PBND was first reported

from India in 1968 on Groundnut (Reddy *et al.,* 1968). Based on haemagglutination test with *TSWV* antiserum, the causal agent of bud necrosis disease was confirmed as *Tomato spotted wilt virus* in 1979 (Ghanekar *et al.,* 1979). The antisera developed to detect *TSWV* failed to detect virus in peanut bud necrosis disease (PBND) infected plants. On the basis of serological differences, Reddy *et al.* (1992) suggested that bud necrosis disease causing virus in India is different and named it as bud necrosis virus. However, it is now referred to as *Groundnut bud necrosis virus* (GBNV) (Fauquet *et al.,* 2005).

In India, *TSV* was first identified on sunflower in Karnataka in 1997 (Singh *et al.,* 1997). Initially PSND was confused with GBND caused by *Tospovirus* and named it as *peanut bud necrosis virus* because of characteristic necrosis of terminal leaflets. Subsequently, extensive studies on physicochemical and biological properties of the virus confirmed it to be *Tobacco streak virus* (TSV) of the genus *Ilarivirus.* Viral diseases of groundnut is a serious constraint for groundnut production in A.P. as well as in India. Hence, the present study was focussed on survey for incidence of viral diseases infecting groundnut.

## MATERIAL AND METHODS

During *kharif* and *rabi* 2020-21, roving surveys were conducted in Guntur and Prakasam districts of Andhra Pradesh to record the incidence of viral diseases infecting groundnut (Fig 1 and 2). Survey was undertaken in three mandals of Guntur and Prakasam districts based on preceding groundnut cultivation statistics. In each mandal two villages were selected and in each village two fields were selected at random. In each field five locations, *i.e.,* at four corners of the field leaving the border rows and one at the centre was selected to record the incidence of viral diseases infecting groundnut and vector population using a one sq. m. quadrant. *GBNV* infection was identified based on chlorotic spot and chlorotic ring on leaf, oak leaf pattern on leaf, drying back from the tip of the leaf, malformed leaves at later stages of the crop, top growing bud necrosis and axillary shoot proliferation with distortion of leaf lamina. *TSV* infection was suspected based on the symptoms such as necrosis of leaves, top growing bud necrosis, necrotic streaks on stem, blackening of pegs and necrotic streaks on pods. The latitude and longitude of each surveyed location was recorded using a global positioning recorder.

The per cent disease incidence was calculated using the following formula

$$\text{Per cent disease incidence (\%)} = \frac{\text{Number of plants infected}}{\text{Total number of plants}} \times 100$$

## RESULTS AND DISCUSSION

TAG 24 is the cultivated variety in all the surveyed fields. *Parthenium hysterophorus* and *Celosia argentea* weeds were observed in all fields. Preceding or surrounding crop in all the surveyed fields is groundnut. Nineteen of fourty-eight groundnut fields surveyed from Guntur and Prakasam districts of A.P. were found with *GBNV* infection and eighteen were found with *TSV* infection during *kharif* and *rabi* 2020-21.

During *kharif* 2020-21, mean GBND incidence ranged from 0.0-4.6 per cent and 0.0-3.25 per cent in the surveyed villages of Guntur and Prakasam districts respectively (Table 1 and 2). In Guntur district, maximum mean GBND incidence (4.6%) and maximum mean thrip population (4 thrips/terminal bud) was recorded from Bapatla-West (Bapatla). No disease incidence (0.0%) was observed in Karlapalem (Karlapalem) and Yenugupalem (Vinukonda) with common mean thrip population of 2 thrips/terminal bud recorded.

In Prakasam district, maximum mean GBND incidence (3.25%) was recorded from Ipurupalem (Chirala) and no incidence (0.0%) was recorded from Samantahpudi, Gavinivaripalem and Ganugapenta of Darsi, Chirala and Kanigiri mandals respectively. Maximum mean thrip population (3 thrips/terminal bud) was recorded from Pothakamuru and Ipurupalem of Darsi and Chirala mandals respectively and minimum mean thrip population (2 thrips/terminal bud) was recorded from Samantahpudi (Darsi), Gavinivaripalem (Chirala), Ganugapenta and Polavaram (Kanigiri).

Similarly, during *rabi* 2020-21, mean GBND incidence ranged from 0.0-12.45% and 0.0-9.9% in the surveyed villages of Guntur and Prakasam districts respectively (Table 3 and 4). In Guntur district, maximum mean GBND incidence (12.45%) was recorded from Maruproluvaripalem (Bapatla) with maximum mean thrip population (5 thrips/terminal bud) recorded and no incidence was recorded from Rentapalle (Sathenapalle) with minimum mean thrip population (2 thrips/terminal bud) recorded.

In Prakasam district, maximum mean GBND incidence (9.9%) was recorded from Machavaram (Kandukur) and no disease incidence (0.0%) was recorded from Gavinivaripalem (Chirala). Maximum mean thrip population (5 thrips/terminal bud) was recorded from Kommunuru and Machavaram of Giddalur and Kandukur mandals respectively and minimum mean thrip population (2 thrips/terminal bud) was recorded from Gavinivaripalem (Chirala). In India, incidence of GBND accounted for 30 to 90 per cent yield loss in groundnut (Basu*et al.,* 1995). Gopal *et al.* (2011) reported PBND incidence of 4.3 to 13.3% in Kurnool districts of A.P.

During *kharif* 2020-21, mean PSND incidence in the surveyed villages of Guntur and Prakasam districts ranged from 2.0-11.5 per cent and 0.0-7.7 per cent, respectively (Table 5 and 6). In Guntur district, maximum mean PSND incidence (11.5%) was recorded from Yazali (Karlapalem) and minimum incidence (2.0%) was observed from Yenugupalem (Vinukonda). Maximum mean thrip population (5 thrips/terminal bud) was recorded from Yazali (Karlapalem) and minimum mean thrip population (2 thrips/terminal bud) was recorded from Yenugupalem (Vinukonda).

In Prakasam district, maximum mean PSND incidence (7.7%) was recorded from Pothakamuru (Darsi) and no incidence (0.0%) was recorded from Polavaram (Kanigiri). Maximum mean thrip population (3 thrips/terminal bud) was recorded from Pothakamuru and Ipurupalem villages of Darsi and Chirala mandals respectively and minimum mean thrip population (2 thrips/terminal bud) was recorded from Samantahpudi (Darsi), Gavinivaripalem (Chirala), Ganugapeta and Polavaram (Kanigiri).

Similarly, during *rabi* 2020-21, mean PSND incidence ranged from 0.0-1.75% in the surveyed villages of Guntur district and no incidence (0.0%) was recorded from the surveyed villages of Prakasam district (Table 7 and 8). In Guntur district, maximum mean PSND incidence (1.75%) and maximum mean thrip population (4 thrips/terminal bud) was recorded from Madhamanchipadu (Vinukonda) and no incidence was recorded from Yenugupalem (Vinukonda), Rentapalle (Sathenapalle), Bapatla-West and Maruproluvaripalem (Bapatla) with minimum mean thrip population (2 thrips/terminal bud) recorded from Rentapalle (Satenapalle) and Maruproluvaripalem (Bapatla).

In Prakasam district, maximum mean thrip population (3 thrips/terminal bud) was recorded from Kommunuru (Giddalur) and minimum mean thrip population (1 thrip/terminal bud) was recorded from Machavaram (Kandukur) and Ipurupalem (Chirala).

The roving survey elucidated that the mean GBND incidence is significantly higher in *rabi* 2020-

**Table 1. GBND incidence in groundnut during *kharif* 2020-21 in Guntur district of Andhra Pradesh**

| District | Mandal | Village | Field No. | GPS Coordinates | Variety | GBND % per $m^2$ | Mean incidence | Symptoms | Thrips population | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Per top bud | Mean population |
| Guntur | Bapatla | Bapatla (West) | 1 | 15.87333N | Tag-24 | 9.2 | 4.6 | | 4 | 4.0 |
| | | | | 80.42621E | | | | CR, BN, ML | | |
| | | | 2 | 15.8821N | Tag-24 | 0.0 | | - | 4 | |
| | | | | 80.41606E | | | | | | |
| | | Bapatla (East) | 1 | 15.89144N | Tag-24 | 0.0 | 0.0 | - | 1 | 2.0 |
| | | | | 80.49998E | | | | | | |
| | | | 2 | 15.91698N | Tag-24 | 0.0 | | | 3 | |
| | | | | 80.50092E | | | | - | | |
| | Karlapalem | Yazali | 1 | 15.9712N | Tag-24 | 8.2 | 4.1 | CR, BN, ASP | 5 | 4.0 |
| | | | | 80.57008E | | | | | | |
| | | | 2 | 15.96513N | Tag-24 | 0.0 | | | 3 | |
| | | | | 80.56624E | | | | - | | |
| | | Karlapalem | 1 | 15.93593N | Tag-24 | 0.0 | 0.0 | | 3 | 2.0 |
| | | | | 80.59243E | | | | - | | |
| | | | 2 | 15.94319N | Tag-24 | 0.0 | | - | 1 | |
| | | | | 80.57329E | | | | | | |
| | Vinukonda | Thimmayapalem | 1 | 16.02514N | Tag-24 | 8.2 | 4.1 | BN, ASP | 4 | 3.0 |
| | | | | 79.70432E | | | | | | |
| | | | 2 | 79.70432N | Tag-24 | 0.0 | | | 2 | |
| | | | | 79.6828E | | | | - | | |
| | | Yenugupalem | 1 | 16.01481N | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | | 79.83918E | | | | | | |
| | | | 2 | 16.02876N | Tag-24 | 0.0 | | - | 2 | |
| | | | | 79.8382E | | | | | | |

*** CR=Chlorotic rings, BN=Bud necrosis, ML=Malformed leaves, ASP=Axillary shoot proliferation**

**Table 2. GBND incidence in groundnut during *kharif* 2020-21 in Prakasam district of Andhra Pradesh**

| District | Mandal | Village | Field No. | GPS Coordinates | Variety | GBND % per $m^2$ | Mean incidence | Symptoms observed | Thrips population Per top bud | Thrips population mean |
|---|---|---|---|---|---|---|---|---|---|---|
| Prakasam | Darsi | Pothakamuru | 1 | 15.73994N 79.76779E | Tag-24 | 0.0 | 3.0 | - | 2 | 3.0 |
| | | | 2 | 15.73816N 79.77137E | Tag-24 | 6.0 | | CR, BN | 4 | |
| | | Samantahpudi | 1 | 15.73401N 79.69767E | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | 2 | 15.73689N 79.69502E | Tag-24 | 0.0 | | - | 2 | |
| | Chirala | Ipurupalem | 1 | 15.85034N 80.39719E | Tag-24 | 6.5 | 3.3 | CR, OLP | 4 | 3.0 |
| | | | 2 | 15.85235N 80.3722E | Tag-24 | 0.0 | | - | 2 | |
| | | Gavinivaripalem | 1 | 15.84834N 80.42271E | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | 2 | 15.83659N 80.42094E | Tag-24 | 0.0 | | - | 2 | |
| | Kanigiri | Ganugapenta | 1 | 15.71178N 79.35565E | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | 2 | 15.68526N 79.32097E | Tag-24 | 0.0 | | - | 2 | |
| | | Polavaram | 1 | 15.79502N 79.88093E | Tag-24 | 5.6 | 2.8 | CR, BN, ASP | 3 | 2.0 |
| | | | 2 | 15.79087N 79.89149E | Tag-24 | 0.0 | | - | 1 | |

***CR= Chlorotic rings, BN=Bud necrosis, OLP=Oak leaf pattern, ASP=Axillary shoot proliferation**

**Table 3. GBND incidence in groundnut during *rabi* 2020-21 in Guntur district of Andhra Pradesh**

| District | Mandal | Village | Field No. | GPS Coordinates | Variety | GBND % per $m^2$ | Mean incidence | Symptoms | Thrips population | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Per top bud | Mean population |
| Guntur | Bapatla | Bapatla (West) | 1 | 15.87333N 80.42621E | Tag-24 | 19.4 | 9.7 | CR, BN, ASP | 6 | 4.0 |
| | | | 2 | 15.8821N 80.41606E | Tag-24 | 0.0 | | - | 2 | |
| | | Maruproluvaripalem | 1 | 15.87085N 80.47332E | Tag-24 | 15.4 | 12.5 | CR, BN, SG | 6 | 5.0 |
| | | | 2 | 15.86373N 80.48551E | Tag-24 | 9.5 | | BN, ASP | 4 | |
| | Sathenapalle | Pakalapadu | 1 | 16.43334N 80.13102E | Tag-24 | 14.6 | 7.3 | CR, NR, OLP | 4 | 3.0 |
| | | | 2 | 16.43187N 80.1362E | Tag-24 | 0.0 | | - | 2 | |
| | | Rentapalle | 1 | 16.47606N 80.13581E | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | 2 | 16.4779N 80.13062E | Tag-24 | 0.0 | | - | 2 | |
| | Vinukonda | Madhamanchipadu | 1 | 16.00723N 79.79419E | Tag-24 | 13.6 | 10.6 | CR, BN | 5 | 4.0 |
| | | | 2 | 15.99648N 79.79153E | Tag-24 | 7.5 | | CR, BN | 3 | |
| | | Yenugupalem | 1 | 16.01481N 79.83918E | Tag-24 | 11.8 | 5.9 | CR, BN | 4 | 3.0 |
| | | | 2 | 16.02876N 79.8382E | Tag-24 | 0.0 | | - | 2 | |

*** CR=Chlorotic rings, NR=Necrotic rings, BN=Bud necrosis, OLP=Oak leaf pattern, ASP=Axillary shoot proliferation, SG= Stunted growth**

**Table 4. GBND incidence in groundnut during *rabi* 2020-21 in Prakasam district of Andhra Pradesh**

| District | Mandal | Village | Field No. | GPS Coordinates | Variety | GBND % per $m^2$ | Mean incidence | Symptoms observed | Thrips population | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Per top bud | mean |
| Prakasam | Giddalur | Kommunuru | 1 | 15.30246N 78.90801E | Tag-24 | 18.2 | 9.1 | BN, ASP | 6 | 5.0 |
| | | | 2 | 15.30654N 78.90752E | Tag-24 | 0.0 | | - | 4 | |
| | | Mundlapadu | 1 | 15.32909N 78.90653E | Tag-24 | 11.4 | 5.7 | CR, BN | 4 | 3.0 |
| | | | 2 | 15.32945N 78.894E | Tag-24 | 0.0 | | - | 2 | |
| | Kandukur | Machavaram | 1 | 15.12817N 79.89862E | Tag-24 | 10.6 | 9.9 | CR, BN, ML | 6 | 5.0 |
| | | | 2 | 15.12703N 79.88723E | Tag-24 | 9.2 | | CR, NR, BN | 4 | |
| | | Palur-Dondapadu | 1 | 15.16122N 79.94699E | Tag-24 | 0.0 | 8.1 | - | 2 | 3.0 |
| | | | 2 | 15.15339N 79.92768E | Tag-24 | 16.2 | | CR, BN, ASP | 4 | |
| | Chirala | Ipurupalem | 1 | 15.85034N 80.39719E | Tag-24 | 11.5 | 5.8 | BN, ASP | 4 | 3.0 |
| | | | 2 | 15.85235N 80.3722E | Tag-24 | 0.0 | | - | 2 | |
| | | Gavinivaripalem | 1 | 15.84834N 80.42271E | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | 2 | 15.83659N 80.42094E | Tag-24 | 0.0 | | - | 2 | |

*** CR=Chlorotic rings, NR=Necrotic rings, BN=Bud necrosis, ML=Malformed leaves, ASP=Axillary shoot proliferation**

**Table 5. PSND incidence in groundnut during *kharif* 2020-21 in Guntur district of Andhra Pradesh**

| District | Mandal | Village | Field No. | GPS Coordinates | Variety | PSND % per $m^2$ | Mean incidence | Symptoms | Thrips population | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Per top bud leaves | Mean population |
| Guntur | Bapatla | Bapatla (West) | 1 | 15.87333N 80.42621E | Tag-24 | 8.3 | 8.9 | LN, BN, PN | 4 | 4.0 |
| | | | 2 | 15.8821N 80.41606E | Tag-24 | 9.5 | | LN, BN, DP | 4 | |
| | | Bapatla (East) | 1 | 15.89144N 80.49998E | Tag-24 | 8.5 | 4.3 | LN, BN, PN | 5 | 4.0 |
| | | | 2 | 15.91698N 80.50092E | Tag-24 | 0.0 | | - | 3 | |
| | Karlapalem | Yazali | 1 | 15.9712N 80.57008E | Tag-24 | 14.0 | 11.5 | LN, BN, PN | 6 | 5.0 |
| | | | 2 | 15.96513N 80.56624E | Tag-24 | 9.0 | | LN, BN | 4 | |
| | | Karlapalem | 1 | 15.93593N 80.59243E | Tag-24 | 6.8 | 3.4 | LN, BN | 4 | 3.0 |
| | | | 2 | 15.94319N 80.57329E | Tag-24 | 0.0 | | - | 2 | |
| | Vinukonda | Thimmayapalem | 1 | 16.02514N 79.70432E | Tag-24 | 7.0 | 3.5 | LN, BN, SG | 4 | 3.0 |
| | | | 2 | 16.04339N 79.6828E | Tag-24 | 0.0 | | - | 2 | |
| | | Yenugupalem | 1 | 16.01481N 79.83918E | Tag-24 | 4.0 | 2.0 | LN, BN | 2 | 2.0 |
| | | | 2 | 16.02876N 79.8382E | Tag-24 | 0.0 | | - | 2 | |

*** LN=Leaf necrosis, BN=Bud necrosis, PN=Petiole necrosis, DP=Death of the plant, SG= Stunted growth**

**Table 6. PSND incidence in groundnut during *kharif* 2020-21 in Prakasam district of Andhra Pradesh**

| District | Mandal | Village | Field No. | GPS Coordinates | Variety | PSND % per $m^2$ | Mean incidence | Symptoms observed | Thrips population | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Per top bud | mean |
| Prakasam | Darsi | Pothakamuru | 1 | 15.73994N 79.76779E | Tag-24 | 9.0 | 7.7 | LN, BN, PN | 4 | 3.0 |
| | | | 2 | 15.73816N 79.77137E | Tag-24 | 6.4 | | LN, BN | 2 | |
| | | Samantahpudi | 1 | 15.73401N 79.69767E | Tag-24 | 5.0 | 2.5 | LN, BN | 3 | 2.0 |
| | | | 2 | 15.73689N 79.69502E | Tag-24 | 0.0 | | - | 1 | |
| | Chirala | Ipurupalem | 1 | 15.85034N 80.39719E | Tag-24 | 6.5 | 5.0 | LN, BN | 4 | 3.0 |
| | | | 2 | 15.85235N 80.3722E | Tag-24 | 3.5 | | LN, BN | 2 | |
| | | Gavinivaripalem | 1 | 15.84834N 80.42271E | Tag-24 | 6.0 | 3.0 | BN, LN | 3 | 2.0 |
| | | | 2 | 15.83659N 80.42094E | Tag-24 | 0.0 | | - | 1 | |
| | Kanigiri | Ganugapeta | 1 | 15.71178N 79.35565E | Tag-24 | 5.0 | 2.5 | LN, BN | 2 | 2.0 |
| | | | 2 | 15.68526N 79.32097E | Tag-24 | 0.0 | | - | 2 | |
| | | Polavaram | 1 | 15.79502N 79.88093E | Tag-24 | 0.0 | 0.0 | - | 1 | 2.0 |
| | | | 2 | 15.79087N 79.89149E | Tag-24 | 0.0 | | - | 3 | |

*** LN=Leaf necrosis, BN=Bud necrosis, PN=Petiole necrosis**

**Table 7. PSND incidence in groundnut during *rabi* 2020-21 in Guntur district of Andhra Pradesh**

| District | Mandal | Village | Field No. | GPS Coordinates | Variety | PSND % per $m^2$ | Mean incidence | Symptoms | Thrips population Per top bud leaves | Thrips population Mean population |
|---|---|---|---|---|---|---|---|---|---|---|
| Guntur | Vinukonda | Madhamanchipadu | 1 | 16.00723N 79.79419E | Tag-24 | 2.0 | 1.8 | LN, BN, PN | 4 | 4.0 |
| | | | 2 | 15.99648N 79.79153E | Tag-24 | 1.5 | | LN, PN | 4 | |
| | | Yenugupalem | 1 | 16.01481N 79.83918E | Tag-24 | 0.0 | 0.0 | - | 2 | 3.0 |
| | | | 2 | 16.02876N 79.8382E | Tag-24 | 0.0 | | - | 4 | |
| | Sathenapalle | Pakalapadu | 1 | 16.43334N 80.13102E | Tag-24 | 3.4 | 1.7 | LN, BN | 3 | 3.0 |
| | | | 2 | 16.43187N 80.1362E | Tag-24 | 0.0 | | - | 3 | |
| | | Rentapalle | 1 | 16.47606N 80.13581E | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | 2 | 16.4779N 80.13062E | Tag-24 | 0.0 | | - | 2 | |
| | Bapatla | Bapatla (West) | 1 | 15.87333N 80.42621E | Tag-24 | 0.0 | 0.0 | - | 4 | 3.0 |
| | | | 2 | 15.8821N 80.41606E | Tag-24 | 0.0 | | - | 2 | |
| | | Maruproluvaripalem | 1 | 15.87085N 80.47332E | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | 2 | 15.86373N 80.48551E | Tag-24 | 0.0 | | - | 2 | |

***LN=Leaf necrosis, BN=Bud necrosis, PN=Petiole necrosis**

**Table 8. PSND incidence in groundnut during *rabi* 2020-21 in Prakasam district of Andhra Pradesh**

| District | Mandal | Village | Field No. | GPS Coordinates | Variety | PSND % per $m^2$ | Mean incidence | Symptoms observed | Thrips population | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Per top bud | mean |
| Prakasam | Giddalur | Kommunuru | 1 | 15.30246N<br>78.90801E | Tag-24 | 0.0 | 0.0 | - | 2 | 3.0 |
| | | | 2 | 15.30654N<br>78.90752E | Tag-24 | 0.0 | | - | 4 | |
| | | Mundlapadu | 1 | 15.32909N<br>78.90653E | Tag-24 | 0.0 | 0.0 | - | 1 | 2.0 |
| | | | 2 | 15.32945N<br>78.894E | Tag-24 | 0.0 | | - | 3 | |
| | Kandukur | Machavaram | 1 | 15.12817N<br>79.89862E | Tag-24 | 0.0 | 0.0 | - | 1 | 1.0 |
| | | | 2 | 15.12703N<br>79.88723E | Tag-24 | 0.0 | | - | 1 | |
| | | Palur-Dondapadu | 1 | 15.16122N<br>79.94699E | Tag-24 | 0.0 | 0.0 | -<br>- | 2 | 2.0 |
| | | | 2 | 15.15339N<br>79.92768E | Tag-24 | 0.0 | | -<br>- | 2 | |
| | Chirala | Ipurupalem | 1 | 15.85034N<br>80.39719E | Tag-24 | 0.0 | 0.0 | - | 1 | 1.0 |
| | | | 2 | 15.85235N<br>80.3722E | Tag-24 | 0.0 | | - | 1 | |
| | | Gavinivaripalem | 1 | 15.84834N<br>80.42271E | Tag-24 | 0.0 | 0.0 | - | 2 | 2.0 |
| | | | 2 | 15.83659N<br>15.83659E | Tag-24 | 0.0 | | - | 2 | |

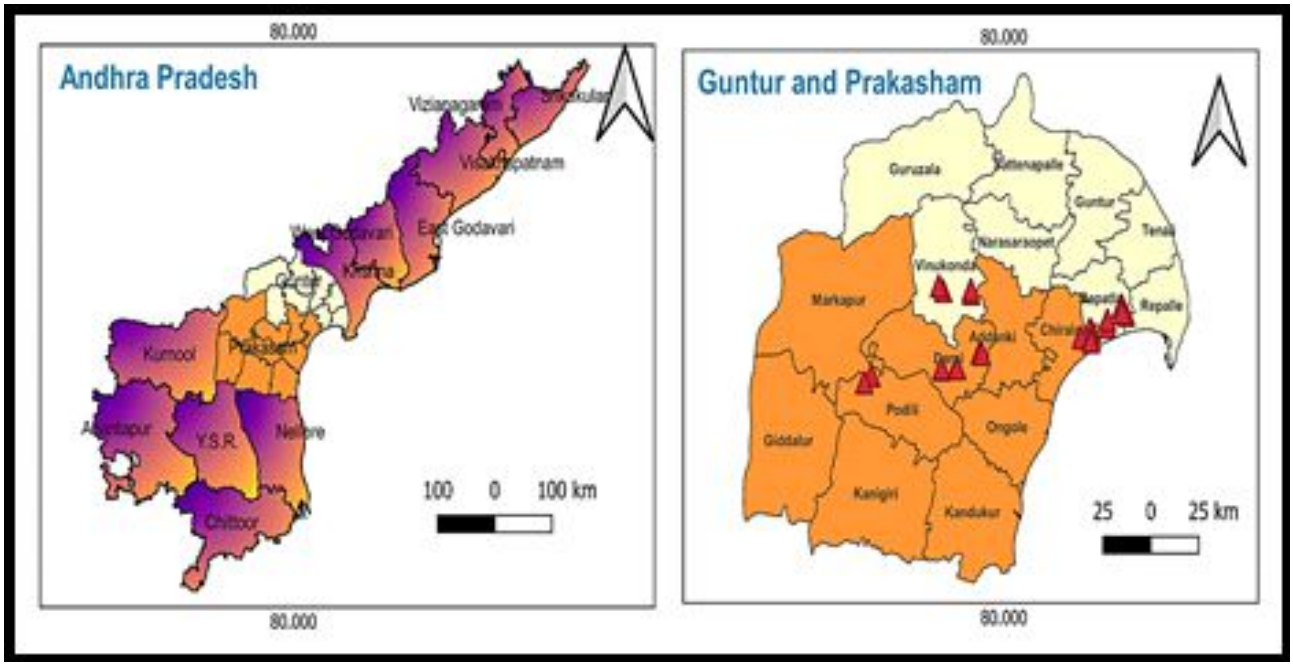


**Fig 1. GPS locations of surveyed areas in Guntur and Prakasam districts of Andhra Pradesh for viral diseases infecting groundnut during *kharif* 2020-21**

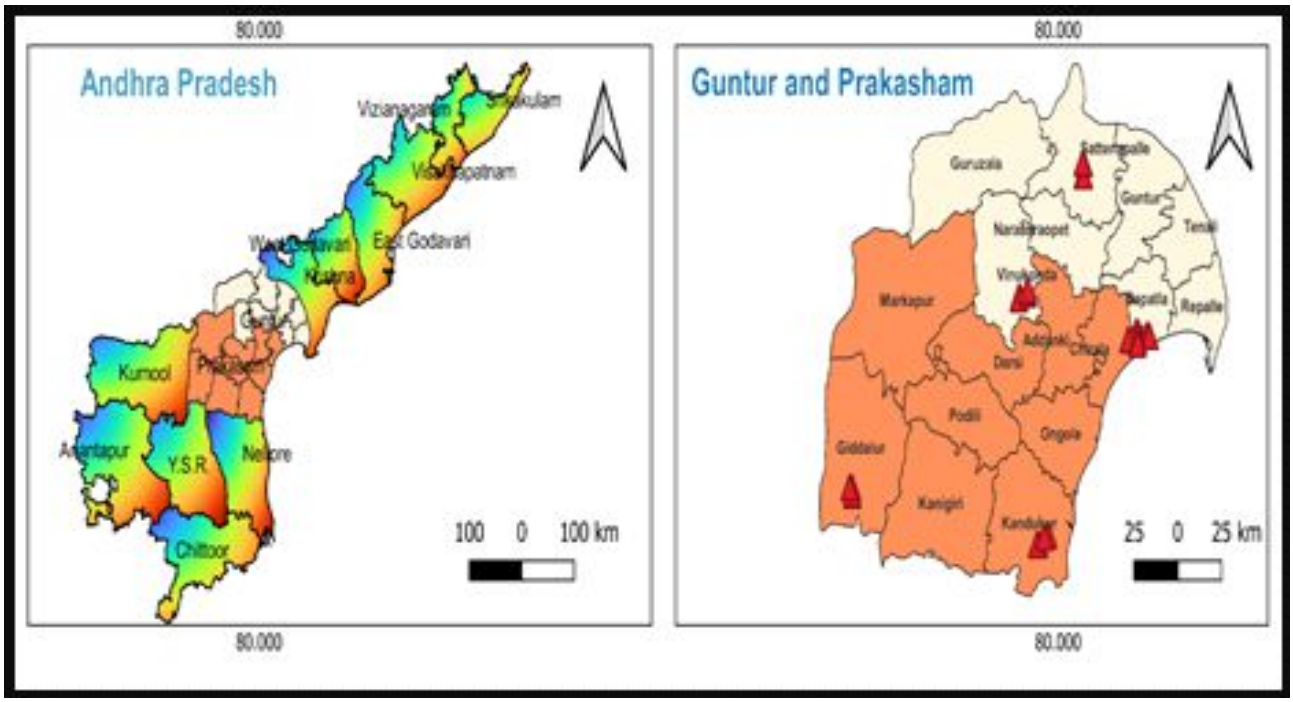


**Fig 2. GPS locations of surveyed areas in Guntur and Prakasam districts of Andhra Pradesh for viral diseases infecting groundnut during *rabi* 2020-21**

21 (7.03%) compared to *kharif* 2020-21 (1.82%). However, a significantly lower *GBNV* incidence was reported in groundnut and other crops during *rabi* season by several researchers (Gopal *et al.,* 2011). During *rabi* 2020-21, buildup of thrips might have been favoured by alternate wetting and drying coupled with high temperature which subsequently increased incidence of GBND. Further, during *kharif* 2020-21, low occurrence of GBND might have been because of continuous rains as it facilitates the washing effect on thrips. In some of the surveyed locations, the disease incidence was recorded low although the thrips population was observed, which could be because of absence of specific vector of *GBNV, Thrips palmi* which transmits *GBNV* in a persistent propagative manner (Vijayalakshmi *et al.,* 1995). Absence of vector and reservoir weed host during the susceptible crop stage can be attributed to low disease incidence in different locations.

Mean PSND incidence is significantly higher in *kharif* 2020-21 (4.52%) compared to *rabi* 2020-21 (0.28%). In the present study, incidence of peanut stem necrosis disease (PSND) was noticed where ever collateral weed host, *Parthenium hysterophorus* was found around the field areas (Table 5, 6, 7 and 8). It is widely distributed and served as the symptomless carrier of *TSV.* Being a pollen borne virus, the role of parthenium in perpetuation and spread of the disease is most significant by supplying infected pollen (Prasada Rao *et al.,* 2003). The importance of infected pollen abundance in spread of the disease by successful pollen mediated thrips transmission using *M. usitatus, F. schultzei* and *S. dorsalis* was reported by Reddy *et al.* (2002).

Large quantities of parthenium pollen are air borne and could move significant distances was suggested by Kanchan and Jayachandra (1980). In the present study, in some areas, low disease incidence was recorded because Parthenium was removed well in advance to groundnut crop by the farmers who were aware of disease spread whereas in some areas, no disease incidence was identified although Parthenium and thrip population was present in the crop which could be attributed to the absence of infected pollen.

## CONCLUSION

The survey results elucidated mean GBND incidence is significantly higher in *rabi* compared to *kharif* 2020-21 whereas, mean PSND incidence is significantly higher in *kharif* compared to *rabi* 2020-21 in Guntur and Prakasam districts of Andhra Pradesh.

## LITERATURE CITED

**Agricultural and Processed Food Products Export Development Authority 2019** Groundnut survey report. https://apeda.gov.in/apeda website/HACCP/2019 Groundnut-Survey-Report.

**Basu M S 1995** Peanut bud necrosis disease: activities in the Indian national programme. In recent studies on peanut bud necrosis disease: proceeding of a meeting, 20 March 1995, ICRISAT Asia centre, India. 61-63.

**Darvin G, Krishna Prasadji J, Manoj Kumar V, Krishnayya P V and Prasuna Rani P 2018** Current status of stem rot (*Sclerotium rolfsii*) and late leaf spot (*Phaeoisariopsis personata*) in major groundnut growing districts of Andhra Pradesh. *The Andhra Agricultural* Journal. 65(3): 594-597.

**Fauquet C M, Mayo M A, Maniloff J, Desselberger U and Ball L A 2005** Virus taxonomy. VIII$^{th}$ report of ICTV, Academic press, New York, USA. 1259.

**Ghanekar A M, Reddy D V R, Iizuka N, Amin P W and Gibbons R W 1979** Bud necrosis of groundnut (*Arachis hypogaea*) in India caused by tomato spotted wilt virus. *Annals of Applied Biology.* 93: 173-179.

**Gopal K, Muniyappa V and Jagadeeshwar R 2011** Weed and crop plants as reservoirs of peanut bud necrosis tospovirus and its occurrence in South India. *Archives of Phytopathology and Plant Protection*. 44(12): 1213-1224.

**Kanchan S and Jayachandra 1980** Pollen allelopathy - a new phenomenon. *New Phytologist*. 84: 739-746.

**Prasada Rao P R D V J, Reddy A S, Reddy S V, Devi T K, Rao C S, Kumar M V, Subramaniam K, Reddy Y T, Nigam S N and Reddy D V R 2003** The host range of tobacco streak virus in India and transmission by thrips. *Annals of Applied Biology.* 142: 365-368.

**Reddy A S, Rao R P, Thirumala Devi K, Reddy S V, Mayo M A, Roberts I, Satyanarayana T, Subramaniam K and Reddy D V R 2002** Occurrence of tobacco streak virus on peanut (*Arachis hypogaea*) in India. *Plant disease*. 86(2): 173-178.

**Reddy D V R, Buiel A A M, Satyanarayana T, Dwivedi S L, Reddy A S, Ratna A S, Vijayalakshmi K, Ranga Rao G V, Naidu R A and Wightman J A 995** Peanut bud necrosis disease: an overview. In recent studies on peanut bud necrosis disease: proceeding of a meeting, 20 March 1995, ICRISAT Asia centre, India. 3-7.

**Reddy D V R, Ratna A S, Sudarshana M R, Poul F and Kumar K I 1992** Serological relationships and purification of bud necrosis virus, a tospovirus occurring in peanut (*Arachis hypogaea*) in India. *Annals of Applied Biology*. 20(2): 279-286.

**Reddy M, Reddy D V R and Apparao A 1968** A new record of virus disease on peanut. *Plant Disease Reporter*. 52: 494-495.

**Singh R B, Srivastava K K, Khurana S M P and Pandey S K 1997** Assessment of yield losses due to potato stem necrosis disease. *Indian Journal of Virology*. 3: 135-137.

**Sreenivasulu P, Reddy C V, Ramesh B and Kumar L 2008** Virus diseases of groundnut. In: characterization, diagnosis and management of Plant Viruses, Volume I: Industrial Crops (eds) Rao G P, Holguin-Pena R J and Kumar L. Studium press LLC, Texas, USA. 47-98.

**Swaroopa K, Sandhya Rani C, Chiranjeevi Ch and Prasanna Kumari V 2018** Influence of different groundnut-cowpea intercropping ratios on sucking pests and their natural enemies. *The Andhra Agricultural Journal.* 65(3): 598-608.

**United States Department of Agriculture 2020** Peanut explorer - IPAD. https://www.ipad.fas.usda.gov/crop explorer.

**Vijayalakshmi K, Whightman J A, Reddy D V R, Rao G V R, Buiel A A M and Reddy D D R 1995** Transmission of peanut bud necrosis virus by Thrips palmi Karny in India. In: Parker BL, Skinner M, Lewis T, editors. Thrips biology and management (NATO ASI series, Life sciences, vol. 276). New York/ London: Plenuno. pp. 179-184.