Summary

Studies on “Vector potential of potato aphids for virus transmission causing plant diseases” carried out in NE hill state viz. Meghalaya, Sikkim, Arunachal Pradesh and Nagaland during 2008-11 to identify sustainable quality seed producing areas in the region. The salient findings are as under.

- Overall the aphid population build-up trends in potato crop (main crop, Feb-June) in all the states and at each selected location are somewhat similar but their population build-up is very slow. The aphid population increase to 20/100 leaves by the end of May and this lasts only for a one month. These places with low and a short span of aphid incidence are satisfactory. Even here if growing crop is examined and regularly virus-infected plant rouged out from the stocks under multiplication, will allow small number of plants to get chance of infection during May-June.

- In all the surveyed stated the potato crop is mainly grown as a rain-fed crop during summer. Under these conditions in all the four states surveyed for monitoring aphid population, the chances of virus dissemination through aphids are further diluted because of high rainfall during mid May to July making free movement of aphids difficult. Besides, late blight generally appears in the crop during late May and kills the foliage by middle of June, start killing potato foliage from ground level to the top so in the absence of green foliage near the ground on which aphids normally multiply and disseminate decrease the chances of virus transmission in potato crop.

- Secondly planting of potato crop in NE hills normally starts in early February and over by end of February, by the time crop is killed with late blight in early June, the crop becomes 100 or more days old and large number of seed size and large size tubers are formed. Present studies further suggested that successful seed crop can be taken by adopting basics of Seed Plot Techniques, as in the sprayed crop, aphid population remained below the critical levels till the maturity (100 days).

- Prevailing weather conditions during crop growth period showed that average minimum and maximum temperatures of 15 and 24±2 °C, respectively during April-May had positive effect on aphid population build-up within the crop, whereas high humidity (70-80%) and total rainfall of 250 to 450 mm during May end to June-July showed negative effect on aphid population build-up. May be due to this reason it was observed that aphid’s population showed declined trends with the onset of monsoons in NE States surveyed.
Amongst the four treatments (T1-T4) in the degeneration trial, the highest yield, 30.15 t/h and 26.35 t/h were recorded at CPRS, Shillong and 32.25 t/h and 32.53 t/h at Kigwema village, Kohima, Nagaland using K.Jyoti and K.Giriraj respectively, were invariably recorded in the crop raised with good quality seeds where all the recommended plant protection practices as suggested in “Seed Plot Technique” were followed against the virus-vectors. Whereas, yields in the crop raised with ware seed potato after four years of field exposure were 22.3 t/h and 17.57 t/h, and 22.51 t/h and 19.25 t/h respectively in cv. K. Jyoti and K. Giriraj at CPRS, Shillong, Meghalaya and Kigwema village, Kohima, Nagaland. The yield of cv. K. Jyoti was reduced to 22.3 from 27.48 t/h (18.85%) in the crop raised with ware potato seed (T-1) in Meghalaya that is slightly lesser than cv. K. Giriraj which was reduced to 17.57 t/h (30.41%) from 25.25 t/h after four consecutive years of field exposure. While in Nagaland comparatively higher yield reduction was recorded i.e. from 31.70 t/h to 22.51 t/h (29.00%) in cv. K. Jyoti where as in cv. K. Giriraj the yield reduction was slightly higher (38.55%) as recorded in Meghalaya.

Reason of higher yields in Nagaland was mainly due to the crop raised in the virgin field reclaimed under ‘Jhum’ cultivation with almost negligible fungal inoculums in the soil.

The infected leaf samples randomly collected from farmers’ fields from surveyed sites were processed in laboratory by adopting ELISA technique and PCR ascertained the aphid transmitted viruses like PVY and PLRV are prevalent at lower altitudes in the states of Meghalaya and Nagaland (< 1700 m amsl) while contact viruses i.e., PVX & PVS are in abundance at all the sites, mainly because farmers use same seed stocks year after year (Table.4). The studies were relevant for identifying locations with low aphid pressure for minimum degeneration of seed stocks for multiplying seed potato crops in the respective NE states.

Based on the present findings on the aphid monitoring & population build-up trends the extrapolated geographical map of NE Hills was drawn and it indicated clear picture of the possible ideal locations for potato seed production in the places located at the altitudes between 2000 to 2700 m amsl. i.e., Ideal sites: (2000-2700 m): Hilley Potato Farm, Rawangla Potato Farm, Okhrey and Ribidi in Sikkim, Upper Wanghoo, Warjung Village in Arunachal Pradesh, Upper Ukule in Nagaland and Shillong Peak in Meghalaya. Reasonable sites (1700—2200 m amsl): Upper Shillong, Lower Wanghoo in Arunachal Pradesh and Kigwema village in Nagaland.
Present findings indicated that the crop productivity can be raised 2-3 folds higher if good quality seed socks are made available to the farmers. With every increase of one ton of potato farmers can earn additional income of rupees ten thousands. Besides, farmers can also save an equal amount for purchasing potato seed for subsequent planting of potato crop. This technology will help in poverty elevation and sustainable potato production in NE hills.