

# SEASONAL ABUNDANCE OF RED SPIDER MITE AND ITS PREDATORS ON SELECTED CASSAVA ACCESSIONS

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## ABSTRACT

In an unsprayed cassava planting, the cassava red spider mite population fluctuated in lesser magnitude in moderately resistant Accessions 8, 12 and 46 than in Golden Yellow and susceptible Accessions 35, 36 and 38. Irrespective of the susceptibility level, population buildup of the spider mite in ViSCA occurred during low rainfall months which, during the two-year period covered, were from December 1978 to April 1979, August and September 1979 and in May, June and July 1980. In some instances, factors other than rainfall seemed to reduce mite population. Temperature and relative humidity did not show adverse effect on spider mite population. Predaceous insects such as coccinellid and staphylinid beetles, cecidomyiid fly and thrips (in decreasing order of abundance) and predaceous phytoseiid mites fluctuated in population density only slightly and showed minimum buildup despite the presence of high mite population. Factors other than predators could have helped also in reducing mite population in certain months. It is suggested that field planting should be planned such that the critical stage of growth of cassava which usually occurs during the third to the fifth month from planting will not coincide with the population peaks of the cassava red spider mite to avoid significant loss in tuber yield.

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**KEY WORDS:** Cassava. Cassava red spider mite. Population densities. Predators. Rainfall. Susceptible or resistant accession. Golden Yellow cassava. Time of planting.

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## INTRODUCTION

The cassava red spider mite, *Tetranychus kanzawai* Kishida, is a major pest of cassava at ViSCA and its vicinity. Although the actual mite

population that can cause significant yield reduction is not known yet, it is believed that yield is often reduced when high infestation occurs during the early stage of growth of cassava particularly at the onset of root

bulking which occurs during the second month of growth (Wholey and Cock, 1974). Scientists of the Centro Internacional Agricultura Tropical (CIAT) in Colombia found that heavy mite infestation occurring when cassava plants are beyond 5 months old usually does not affect yield significantly. On cotton, researchers at the Central Luzon State University have recommended that control measures should be applied as soon as the population reaches 25 mites per leaf to prevent defoliation of the plants and significant yield loss. However, this mite involved is different from that one infesting cassava.

One possible way to reduce the disastrous effects of mites on cassava yield is to time planting during the year to avoid coincidence of the high spider mite population, which usually occurs during the dry season, with the critical growth stage of the plant. It has been observed that the mite is noticeably damaging in different regions of the country at varying times of the year depending on the prevailing climatic patterns and possibly other environmental factors affecting the establishment of the mite population. In ViSCA, however, where the dry period is not very distinct and usually varies from year to year and with rainfall reaching more than 254 cm per year, it is not known specifically how the mite population behaves yearly.

This paper, therefore, reports on the seasonal abundance of the cassava red spider mite and its predators in unsprayed cassava

plantings, how the population is influenced possibly by the prevailing environmental conditions in the area, and the apparently appropriate time to plant cassava in the field to avoid severe mite damage during the critical stage of growth of the plant.

## MATERIALS AND METHODS

Initially, 50 cassava accessions were planted in the ViSCA Experimental Field. Of this number, 27 accessions representing varying levels of resistance/susceptibility were selected and continuously planted to monitor yearly population densities of the cassava red spider mite simulating a plantation size commonly found in farmers' fields. Data were taken from all the 27 accessions but this paper presents only the data taken from 6 representative accessions and from Golden Yellow variety which was used as the standard variety in all field and laboratory studies. The data on predator population were taken from 2 accessions and from Golden Yellow variety for one-year period.

Ten stem cuttings of each cassava accession measuring 25 cm long were planted on ridges in a diagonal fashion. Two rows of the Golden Yellow variety were planted on borders and in-between rows of each accession to insure mite population in the experimental area. The distance between rows was 100 cm and 75 cm between hills. All the necessary cultural practices for growing the crop such as weeding,

cultivation, appropriate fertilizer and rates of application were done, but the plants were never sprayed with pesticides.

Two months after planting and at two-week intervals thereafter until harvest, the population of the mite and its predators was monitored by taking 5 randomly selected mature leaves per plant. The leaves were placed in plastic bags, brought to the laboratory and placed in the refrigerator for 24 hr to render the mites and predators immobile, and therefore, facilitated counting. The different stages of the cassava red spider mite and its predators were counted under a stereoscopic microscope using a tally counter. New planting of the same cassava accessions was done two months before harvest of the previous crop until seasonal abundance of the mites was monitored for a two-year period.

Meteorological data from 1978 to 1980 were obtained from the ViSCA Agrometeorology Station and the possible effects on the cassava red spider mite population were determined.

## RESULTS AND DISCUSSION

The average number of cassava red spider mites which attacked the 6 cassava accessions and the Golden Yellow variety from 1978 to 1980 is shown in Fig. 1, while meteorological data are shown in Fig. 2. There were striking differences in the population fluctuation patterns of the cassava red spider mite on the test accessions and on the Golden

Yellow variety.

In June and July 1978, which were characterized by low rainfall, high mite population was encountered on Golden Yellow variety and on moderately resistant Accession number 12 while low mite population occurred on all other accessions. High rainfall in December 1978 caused a sudden drop in the population of this spider mite particularly on all moderately resistant Accessions 7, 12 and 46 and on Golden Yellow variety compared to susceptible accessions. From January to May 1979, again characterized by low rainfall, spider mite began to increase on all accessions and on Golden Yellow variety, with higher mite population recorded on susceptible Accessions 36 and 38 and on Golden Yellow variety than on moderately resistant accessions. Furthermore, during the low rainfall months of August to September 1979, high mite population was recorded again on all susceptible accessions compared to that on Golden Yellow and on moderately resistant accessions.

During the high rainfall months, from October to December 1979, mite population was very low even on susceptible accessions and on Golden Yellow, although slight buildup in mite population on moderately resistant Accession 12 occurred, suggesting that rainfall was not the only factor limiting population buildup and that accessions may react differently to spider mite attack at certain times of the year. Mite population began to increase again on all accessions and

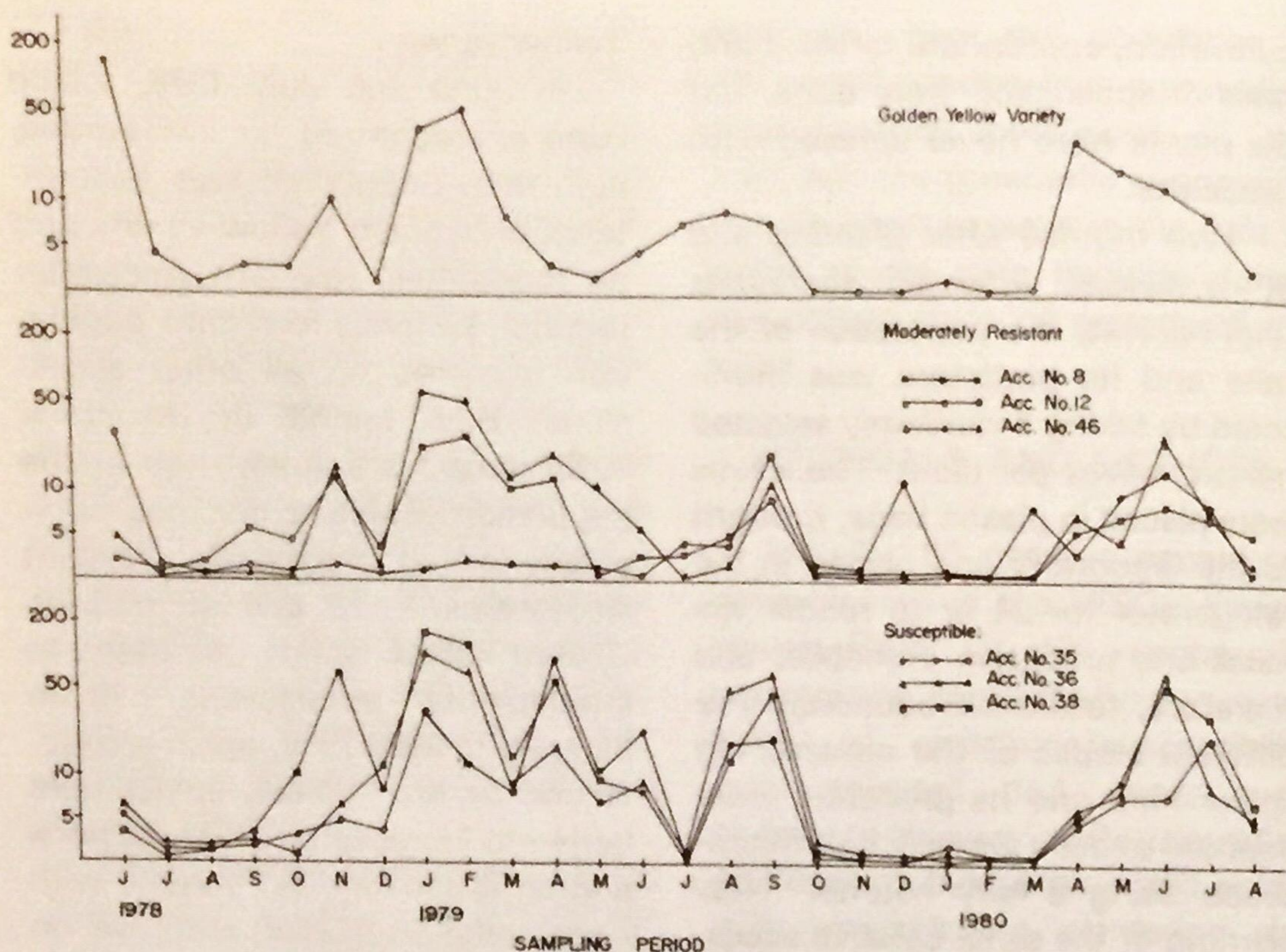


Fig. 1. Population density of cassava red spider mite on 6 cassava accessions and Golden Yellow variety.

on Golden Yellow variety during the low rainfall months of March to May 1980 and continued building up even during the high rainfall month of June 1980. This suggests that gradual decrease in mite population was a characteristic effect of high rainfall. Mite population then continued to occur in low level from July to August 1980 when rainfall was high. Similar trend was observed in Africa based on the report of Yaseen and Bennett (1976) that the cassava green mite population density was closely related to rainfall. Dry periods were conducive to the development of high mite density. Nyiira (1976) also found that rain and possibly relative humidity had negative effects on mite population buildup.

In general, mite population on moderately resistant varieties did not reach the high level observed on susceptible varieties suggesting that if this can be coupled with proper timing of planting, serious mite damage can be avoided without the use of pesticides. It should be noted that the damage observed on the leaves of moderately resistant varieties was not as severe as that observed on the susceptible accessions although high mite population developed also on the former, suggesting varietal tolerance.

Temperature ranged from 26 to 28°C for the two-year period. It did not fluctuate very much so that its possible effect on the mite population buildup did not become apparent. Likewise, relative humidity

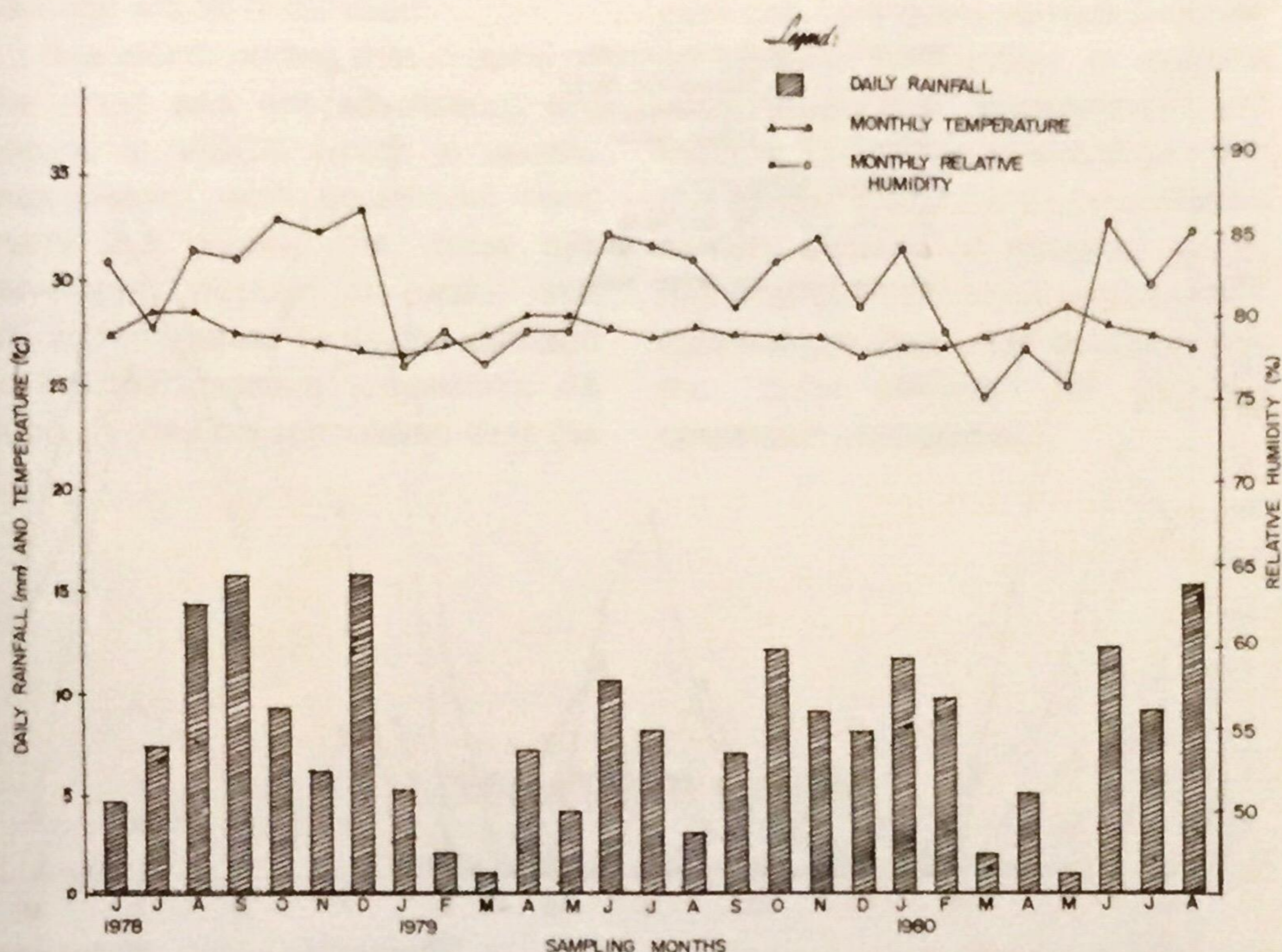


Fig. 2. Average daily rainfall, monthly temperature and relative humidity from 1978-1980.

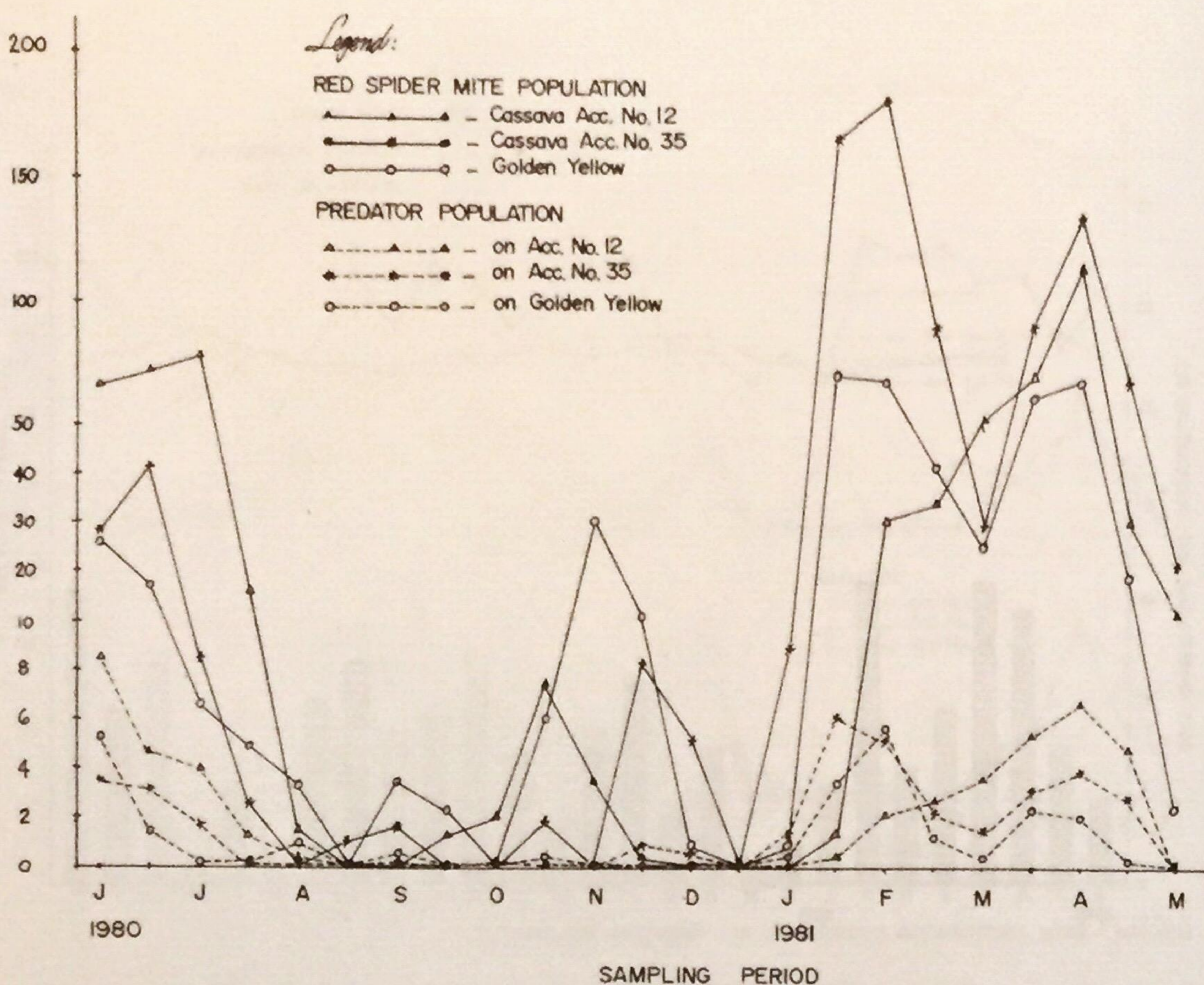
fluctuated from 76 to 85% throughout the duration of the study. Although somewhat lower relative humidity occurred from February to May 1979 and 1980 compared to other months, its possible effect on mite population buildup was also difficult to assess since the range remained within the usually favorable level for arthropod development in general.

The number of predaceous insects and mites present on two cassava accessions and on Golden Yellow variety from 1980 to 1981 is represented in Fig. 3. The decision to take data on population of predators was made only upon noticing the possible controlling effect of factors other than rainfall

as suggested by the data gathered earlier, hence, the shorter observation period for this aspect of the study.

The predaceous insects in the cassava plantings were mostly coccinellid and staphylinid beetles and throughout the sampling periods, their presence was more noticeable compared to other predaceous species such as cecidomyiid fly and thrips. Bennett and Yaseen (1975) also mentioned that coccinellid and staphylinid beetles, cecidomyiid fly, thrips and phytoseiid mites were the natural enemies of *Mononychellus tanajoa* (Bondar), the green spider mite attacking cassava in Trinidad and Tobago.

Populations of the predators



**Fig. 3.** Average number of red spider mite and its predators found on two cassava accessions and Golden Yellow variety.

were relatively low and were slightly higher on moderately resistant Accession 12 than on the susceptible Accession 36 and on Golden Yellow variety. Also, they remained generally low despite high mite density on two accessions and on Golden Yellow variety except for the slight buildup that occurred from June to July 1980 and from January to April 1981. This kind of oscillation in the prey-predator population observed in this study is somewhat different from results of most studies on population dynamics of economically important insect pests. Usually, when the prey population begins to decline as effected by the predator, the density

of the predator still remains high as a result of the steady high prey density of the preceding generation. If this were the case, the predator population should have remained high even when the spider mite population began to recede in May 1981. Other factors then must have contributed to the downward trend in mite population during this month.

In general, high mite populations usually occur in ViSCA from February to May each year, hence, field planting of cassava should be timed such that the third to the fifth month growing period of the crop will not fall on said months. In this way, yield losses due to mite

damage will be minimized.

It is worth noting that in spite of the short and not so distinct dry season in ViSCA which is usually interspersed with occasional rains every 2-3 weeks, the mites still developed population peaks that caused moderate to severe damage to the test cassava accessions. As such, it may be speculated that the

pest can be a more serious problem in cassava production in regions with long and pronounced dry season. Therefore, it would be ideal if a similar study on the population density pattern of cassava spider mites can be monitored also in other cassava growing areas to determine the "safer periods" for growing cassava in said places.

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