Climatological Analysis for the agroecological zoning of the peach tree in San Pablo de Pillao, Huánuco

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Abstract: Planning in the distribution of crops in rural areas through the Agroecological Zoning (ZAE), has become a useful tool for precision agriculture and sustainable development. With this purpose, in the district of San Pablo de Pillao with an area of 59,284.20 ha and located in the center of the department of Huanuco in Peru, the optimal areas for the cultivation of peach trees were determined, a crop with a stable value in the market and highest profitability in Huanuco. To do this, the method of the Analytical Process Hierarchical (APH) was applied, which is usually used in multi-criteria analysis for the determination of areas of the ZAE according to the level of aptitude for the agroecological development of a certain plant.

Keywords: Agroecological Zoning, Geographic Information Systems, Drought, Climate Analysis

Methods

The study area located in the Andean region of Peru (Figure 1), has little information on weather stations, therefore the PISCO product was used: product of precipitation 1990-2020 (V2.1) and temperature 1987-

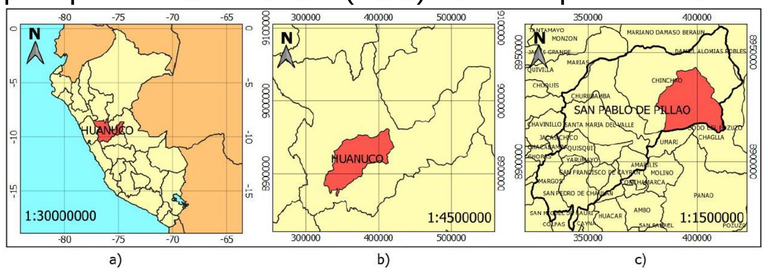

Figure 1: Study area, a) Huanuco Region, b) Huanuco Province c) San Pablo de Pillao District

The monthly information was extracted for the study area and interpolated with the geostatistical techniques of IDW for temperature and Ordinary Kriging for precipitation. Then with this information averaged for the study area, the analysis of this monthly and annual time series was made with box plots, histograms. In addition, a trend analysis was performed with the non-parametric Mann-Kendall test on the annual data. Finally, for the analysis of droughts the Standardized Precipitation Index (SPI) at monthly scales of 3, 6 and 9 months. The aptitud levels for the peach tree are defined in Table 1.

Table 1: Ranges of aptitude levels

Subcriterios	Nivel de aptitud			
	Óptimo	Medio	Bajo	No Apto
Precipitación(mm)	800 – 1400	600 – 800 y 1400 – 1500	400 – 600 y 1500 – 2200	< 400 y > 2200
Temperatura(°C)	21 – 26	14 – 21 y 26 – 27	8 – 18 y 27 – 40	< 8 y > 40

Results

Study area: Climate Analysis 1987-2020

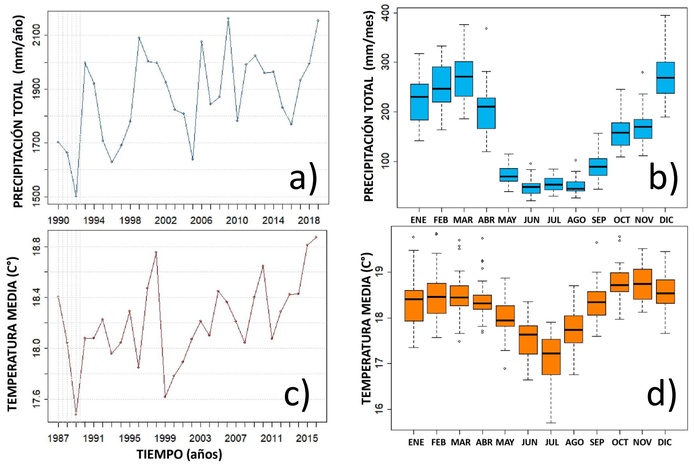

Figure 2: a) Annual accumulated precipitation; b) Monthly accumulated precipitation boxplot; c) Annual average temperature; d) Monthly average temperature boxplot

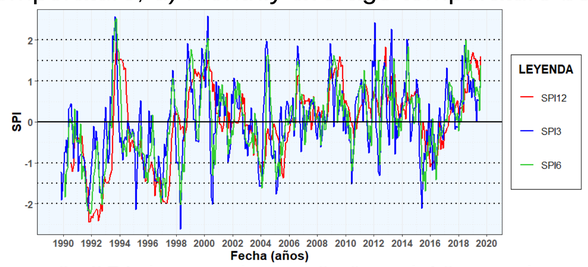

Figure 3: SPI time series at 3, 6 and 12 month scales

Table 2: Probability of occurrence of average droughts in study area

Índice de SPI	Categoría de sequías	Probabilidad de ocurrencia (%)		
		3 meses	6 meses	12 meses
-1.0 a -1.49	Moderada	14.96	16.41	16.33
-1.5 a -1.99	Severa	6.26	6.65	8.01
-2.0 a más	Extrema	1.73	1.72	4.00

Conclusions

The multi-annual climatic variability show a trend significative to increase the annual average precipitation at a rate of 9.59 mm / year, which favors the peach tree; moreover, show a trend significative to increasing the average temperature at a rate of 0.023 ° C / year, which would not significantly affect the peach tree, since it has a wide range of adaptation to the variability of maximum and minimum temperatures. While the probability of occurrence of extreme droughts in the study area is less than 4%, therefore, it does not represent a danger for the agricultural development of the peach tree.

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