

Welcome

# Climatic variability and its impact on crop productivity in South Saurashtra Agroclimatic Zone

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HAU., Hissar



# INTRODUCTION

- Climatic variability is the major factor influencing agricultural productivity and sustainability in the tropics.
- Recent climatic studies suggest that India may experience a rise in temperature of 1°C by 2050.
- Climatic changes may have adverse effect on agriculture.
- India is a vast country with distinguished regional climatic variations
- There is a need to quantify regional climatic variability to assess its effect on area, production and productivity of crops.



# OBJECTIVE

- To find out the tendency of rainfall and temperature and its impact on groundnut and cotton area, production and productivity over Junagadh region of South Saurashtra Agro climatic Zone.



# METHODOLOGY

- Daily rainfall data for 45 years (1960-2004), maximum temperature and minimum temperature data for 25 years (1984-2008) of Agro met observatory at JAU, Junagadh (lat. 20° 30'N, long. 72° 30'E and msl 83 m.).
- Corresponding area, production and productivity of cotton and groundnut of Junagadh district.
- Statistical parameters like mean, SD, CV, median, trend analysis, moving averages and correlation studies.



# RESULTS

## Rainfall trend

- Mean monsoon rainfall of Junagadh is 902.6mm with 47.7% variability and mean monsoon seasonal rainfall is 856.2mm with 50% variability. Ninety six per cent annual rainfall is received during rainy season including October rainfall. July is the rainiest month with 41% of season's rainfall received during the month.
- Monsoon season and monthly rainfall tendency indicated that monsoon rainfall, June and July rainfall is **decreasing** over the years, whereas rainfall during August and Sept. is **increasing**. This indicates shifting of monthly rainfall trend.



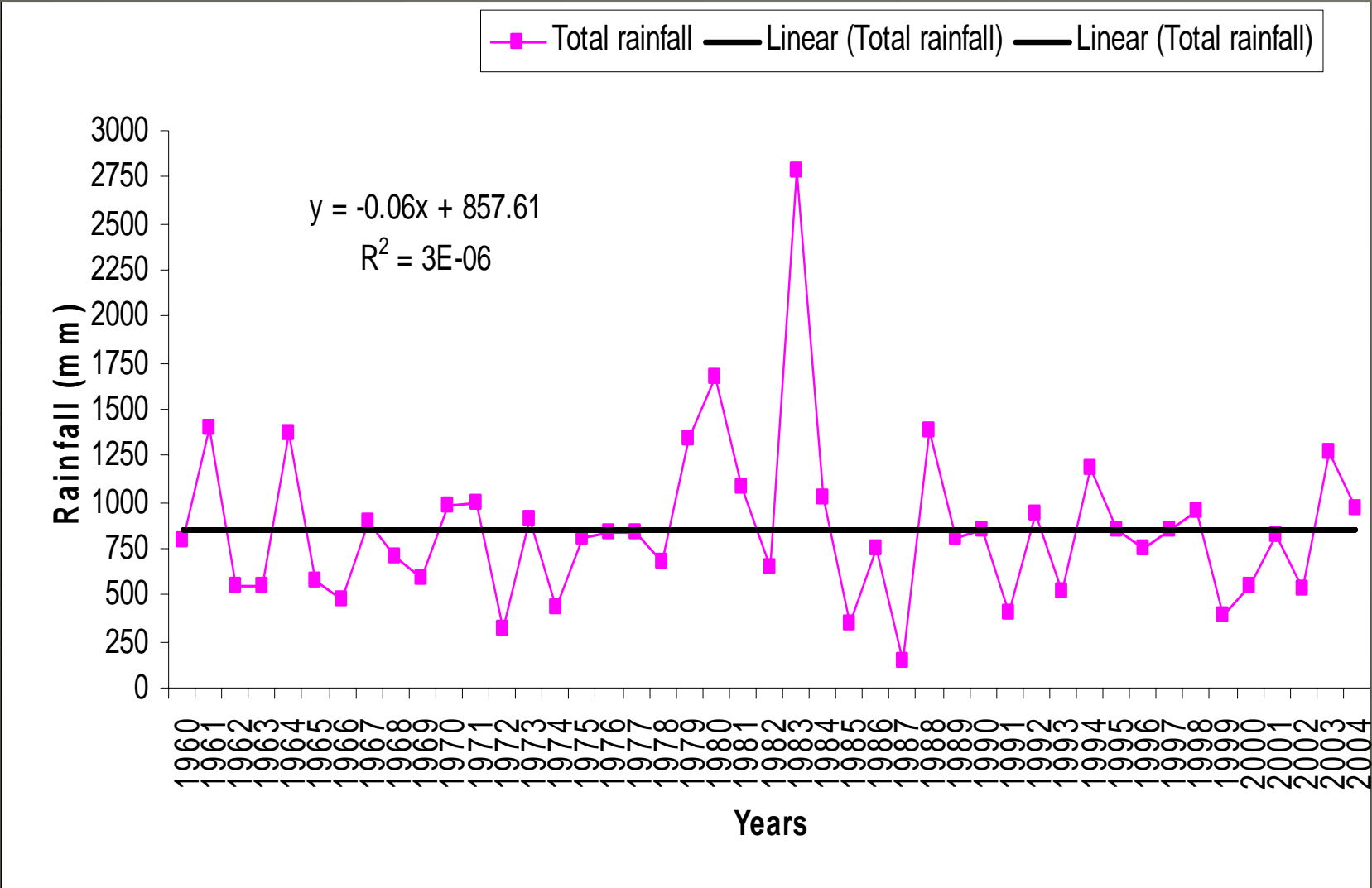
## Temperature trend

- Mean monthly maximum temperature from June to September and annual mean maximum temperature is **decreasing** over the study period.
- Mean monthly minimum temperature from June to August is **decreasing** whereas the Sept. temperature and annual mean minimum temperature are **increasing** over the years.
- The annual mean **average** temperature is negligibly decreasing.



## Rainfall Statistics

| Month  | Mean  | SD    | CV %  | Median | % of Season | % of Annual |
|--------|-------|-------|-------|--------|-------------|-------------|
| June   | 190.6 | 253.5 | 130.5 | 148.6  | 22          | 21          |
| July   | 332.2 | 225.9 | 67.9  | 309.4  | 41          | 38          |
| August | 198.6 | 168.4 | 82.7  | 158.8  | 23          | 22          |
| Sept.  | 103.2 | 81.1  | 89.4  | 95.9   | 14          | 13          |
| Oct.   | 31.9  | 48.5  | 157.2 | 14.0   | -           | -           |
| Season | 856.2 | 439.8 | 49.9  | 811.0  | -           | 96          |
| Annual | 902.6 | 427.5 | 47.4  | 862.4  | -           | -           |



Monsoon rainfall trend over Junagadh district.



## Temperature Statistics

| Maximum temperature (°C) |      |     |     |        | Minimum temperature (°C) |     |     |        |
|--------------------------|------|-----|-----|--------|--------------------------|-----|-----|--------|
| Month                    | Mean | SD  | CV% | Median | Mean                     | SD  | CV% | Median |
| June                     | 36.0 | 1.1 | 3.2 | 36.2   | 26.6                     | 0.5 | 1.9 | 26.6   |
| July                     | 31.7 | 1.3 | 4.1 | 31.6   | 25.4                     | 0.7 | 2.6 | 25.5   |
| August                   | 30.5 | 1.2 | 4.0 | 30.5   | 24.6                     | 0.5 | 2.1 | 24.6   |
| Sept.                    | 32.7 | 1.2 | 3.6 | 32.8   | 23.8                     | 0.5 | 2.3 | 23.8   |
| Oct.                     | 35.7 | 1.4 | 3.9 | 35.3   | 21.2                     | 1.5 | 7.1 | 21.2   |
| Annual                   | 34.0 | 0.7 | 2.0 | 33.9   | 20.4                     | 0.8 | 3.8 | 20.2   |

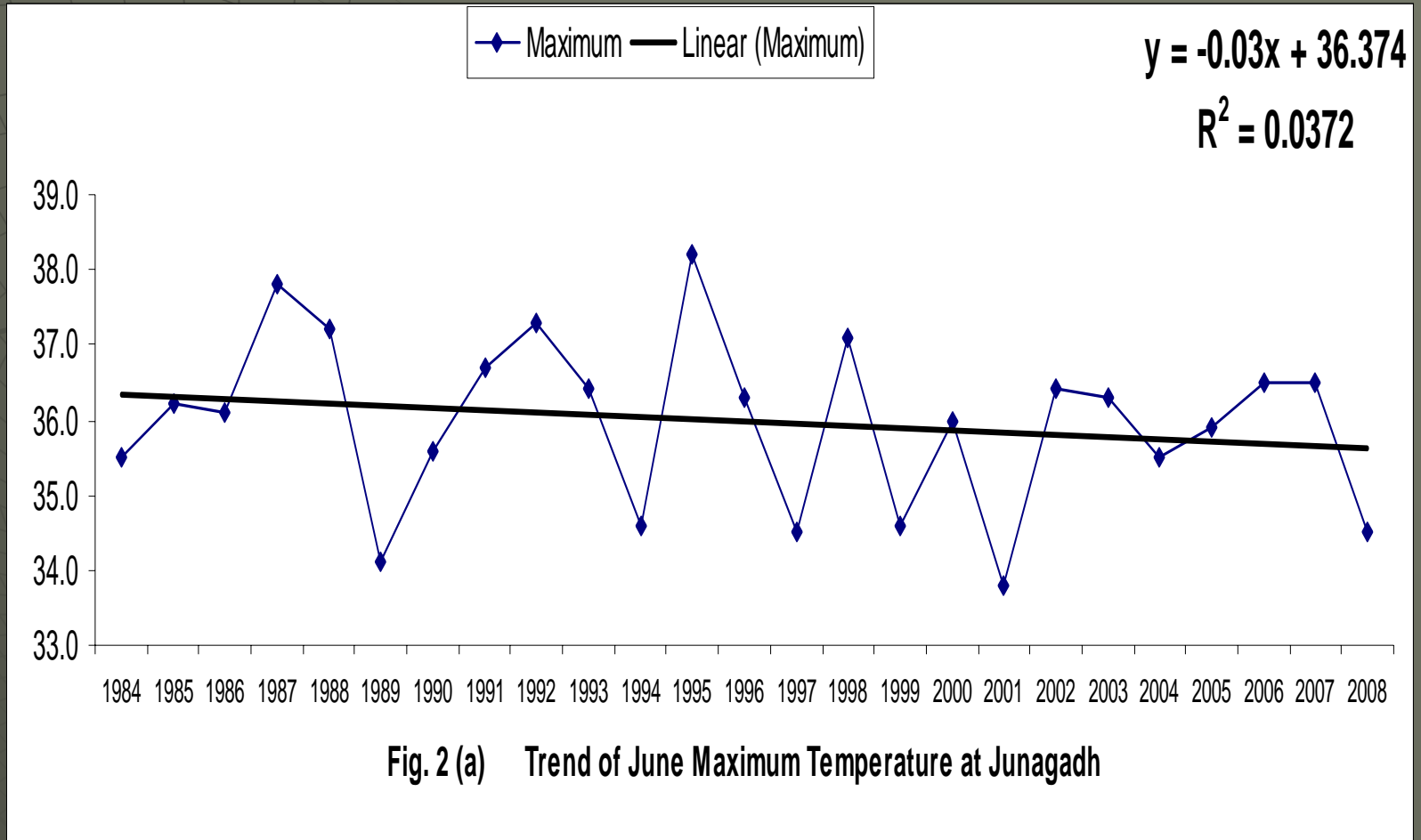


Fig. 2 (a) Trend of June Maximum Temperature at Junagadh

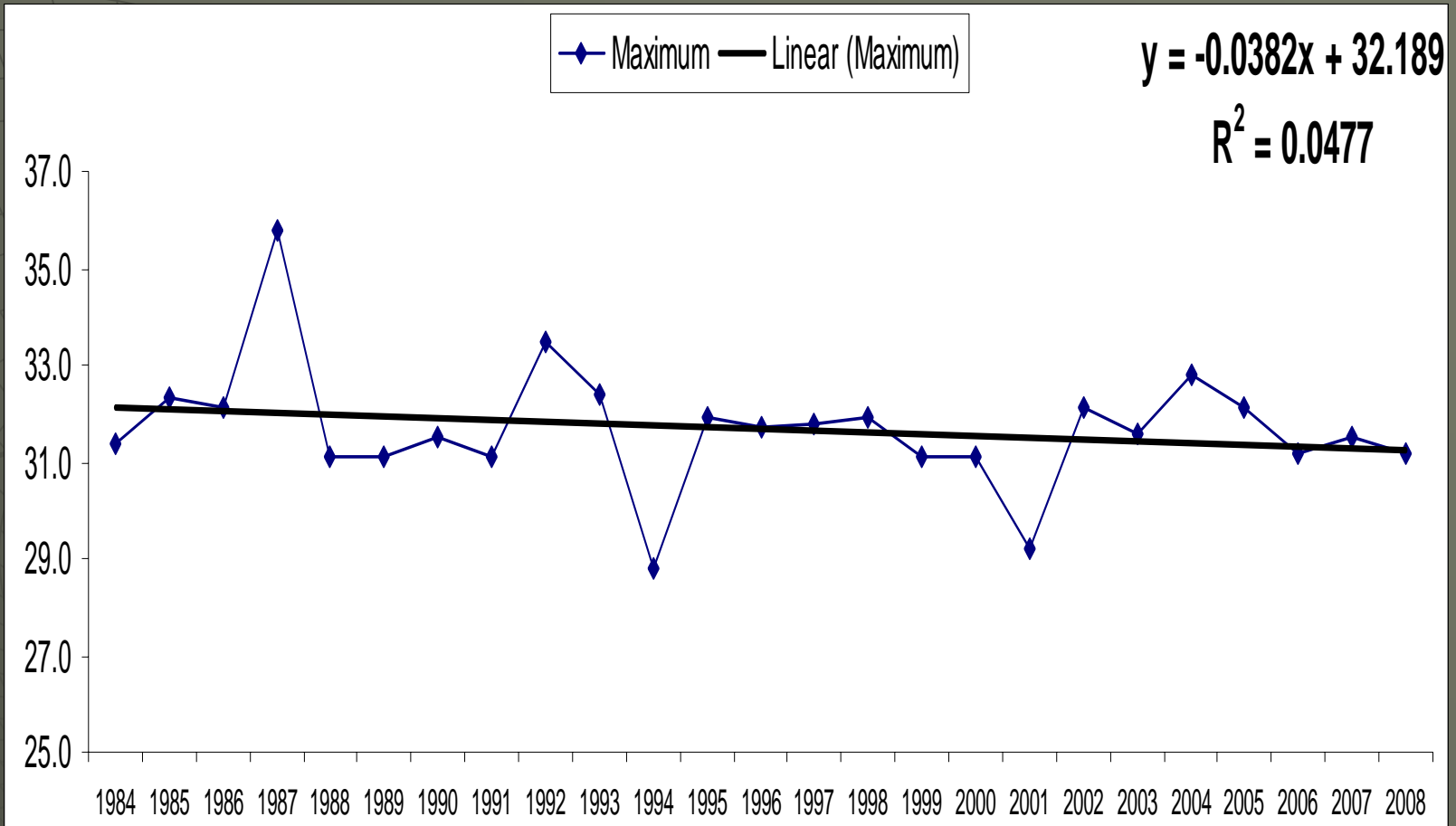


Fig. 2(b) Trend of July Maximum Temperature at Junagadh

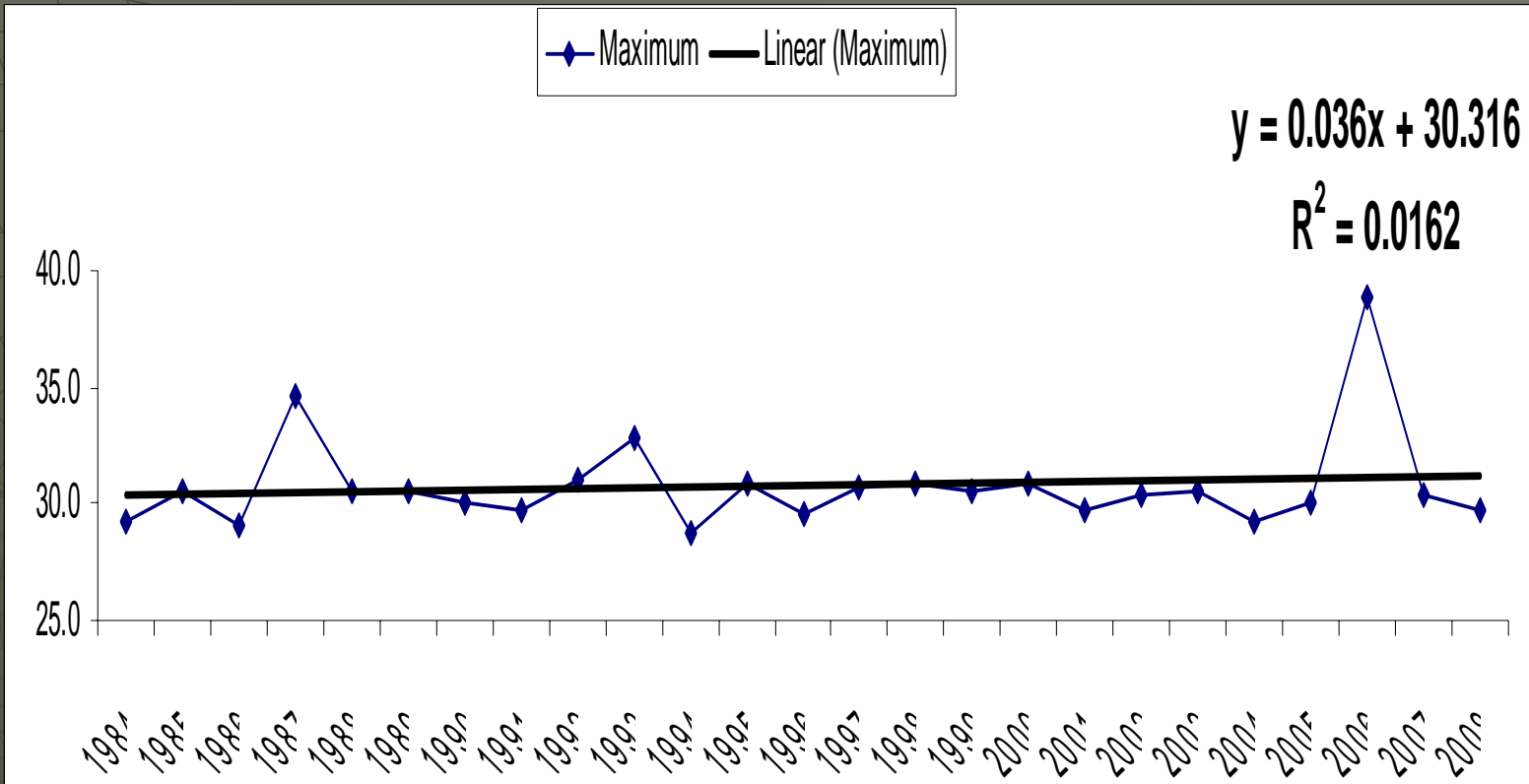


Fig. 2(c) Trend of August Maximum Temperature at Junagadh

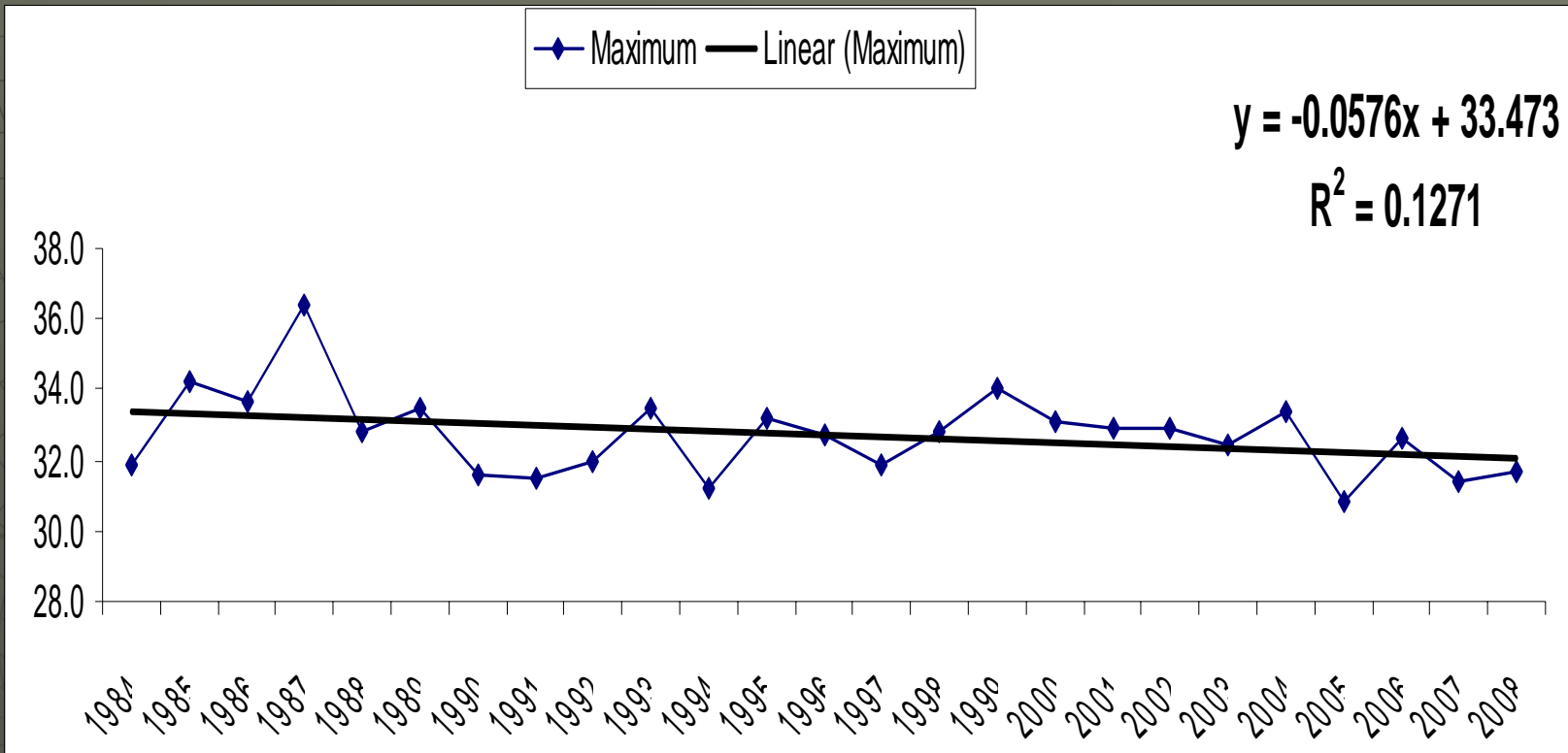


Fig. 2 (d) Trend of September Maximum Temperature at Junagadh

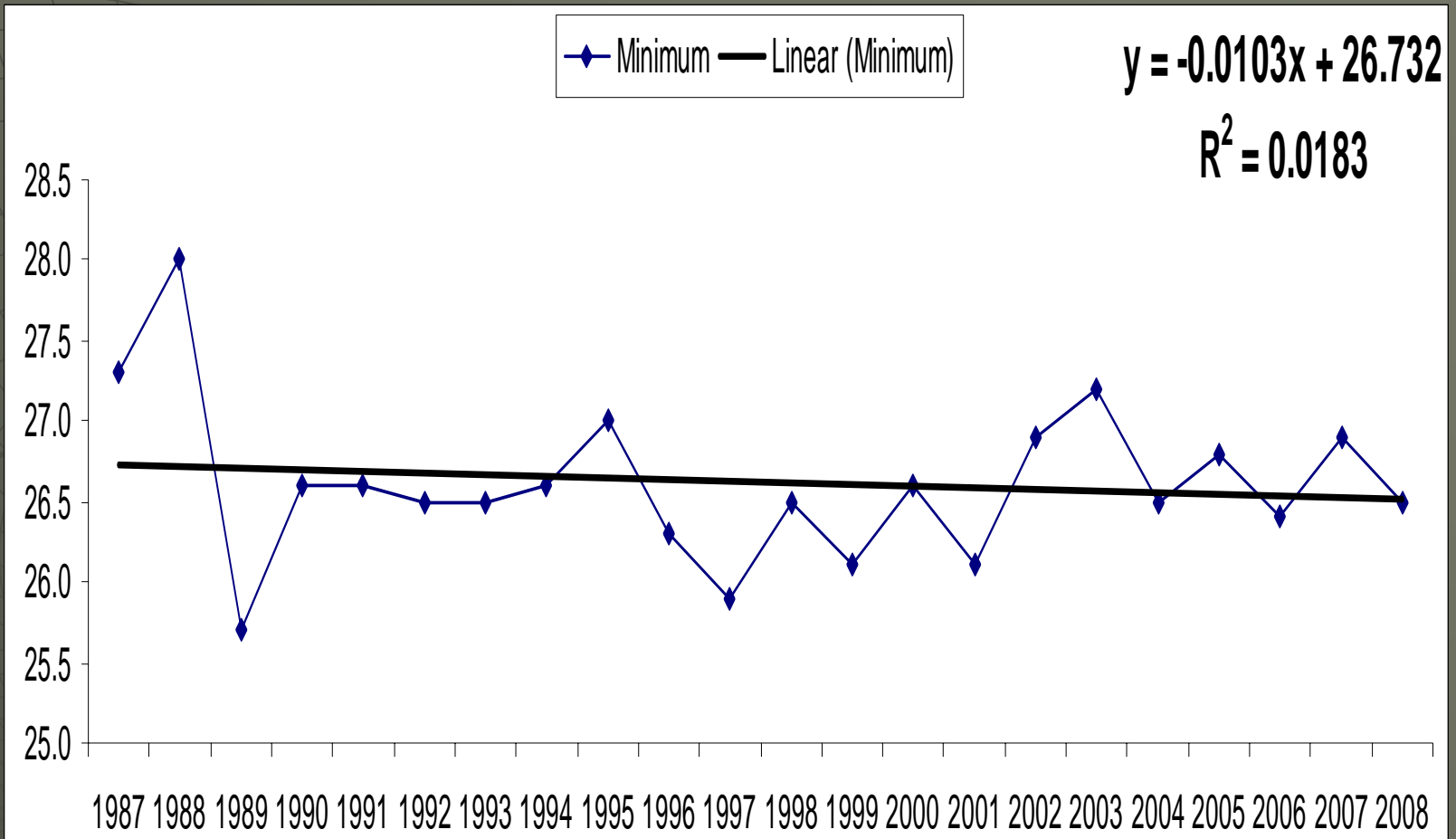


Fig. 3(a) Trend of June Minimum Temperature at Junagadh

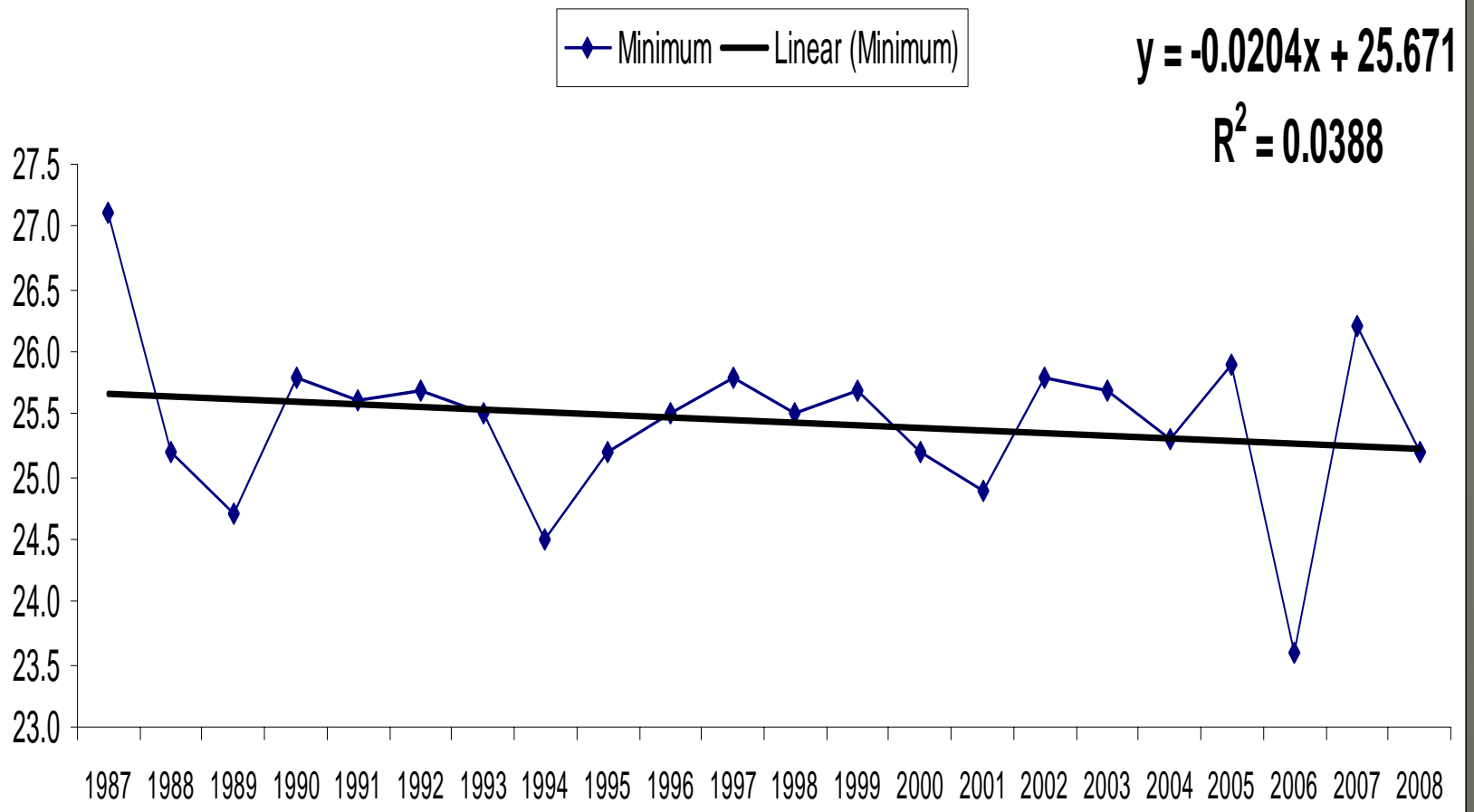


Fig. 3(b) Trend of July Minimum Temperature at Junagadh

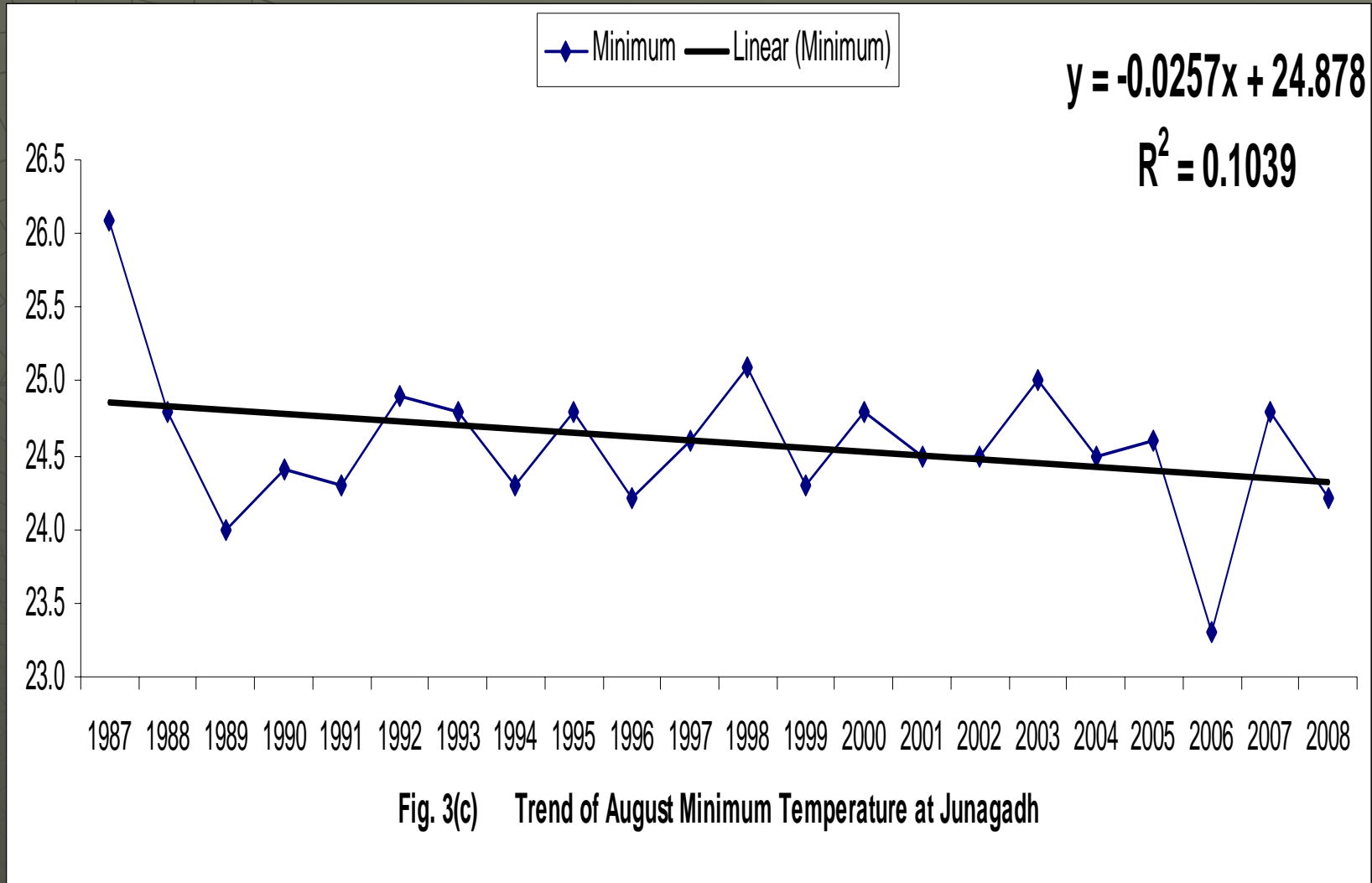


Fig. 3(c) Trend of August Minimum Temperature at Junagadh

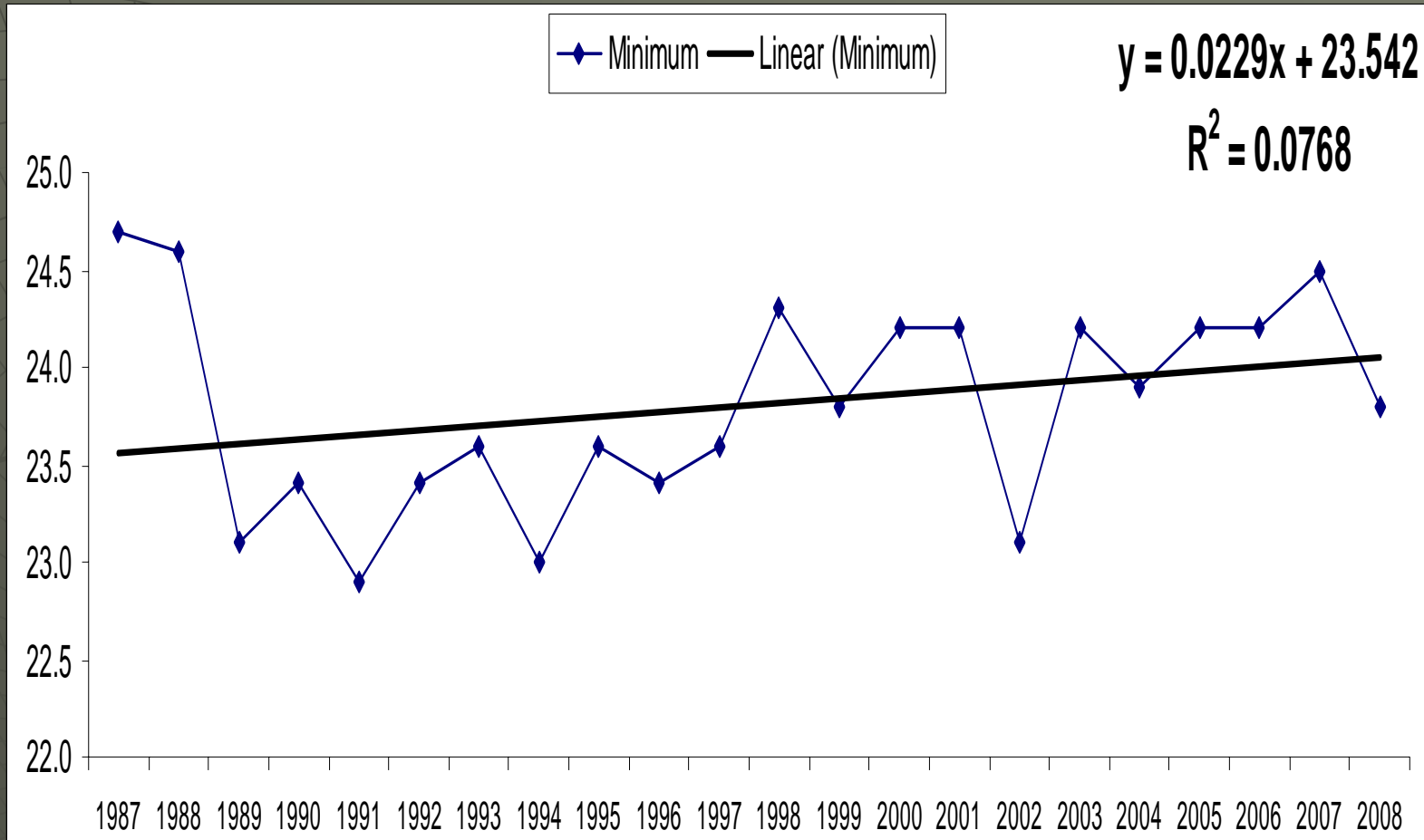


Fig. 3(d) Trend of September Minimum Temperature at Junagadh



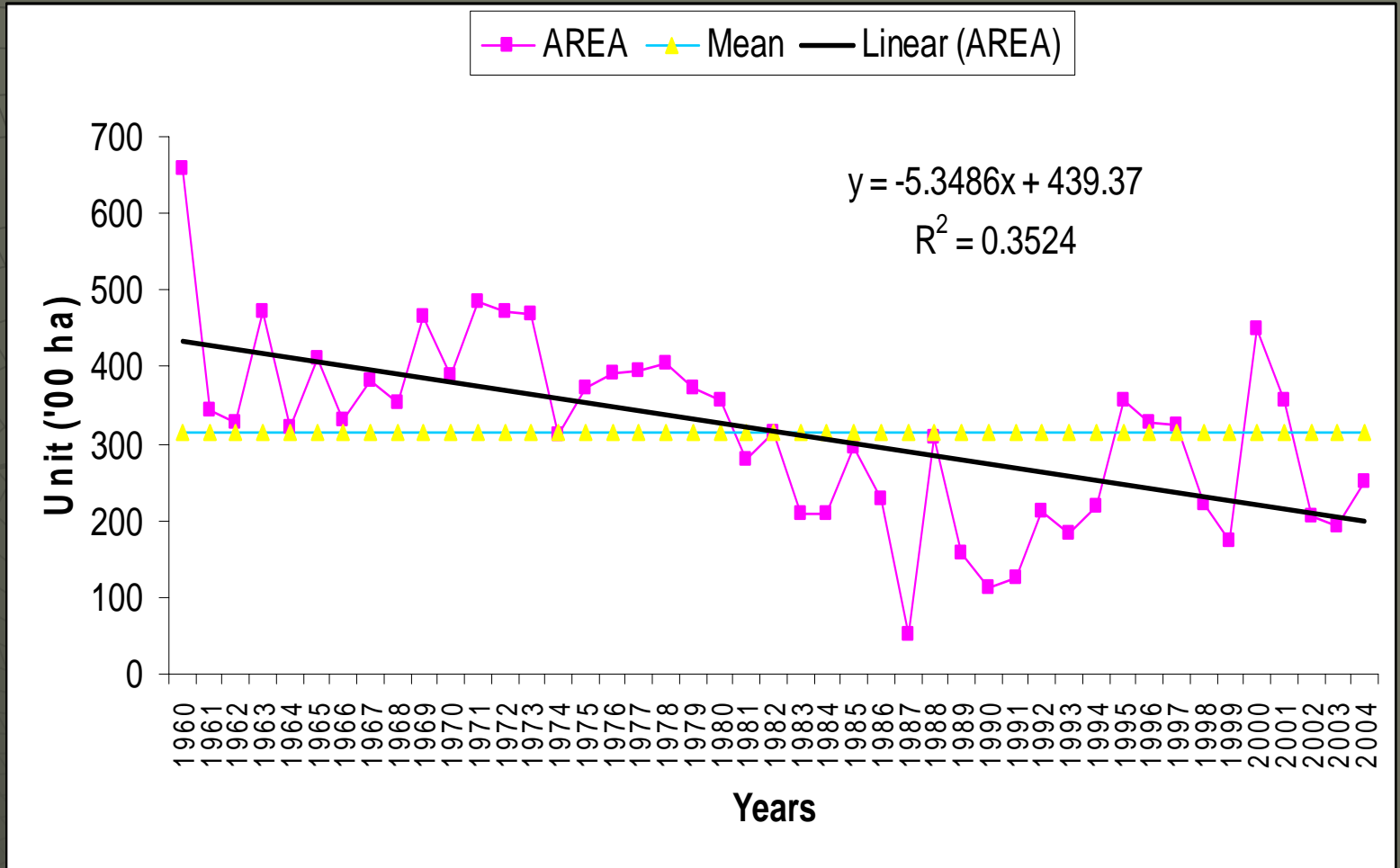
## Impact of climatic variability on groundnut and cotton

- ✓ The groundnut area, production and productivity are **increasing** during the period of study in the Junagadh district.
- ✓ The area under cotton is **decreasing** whereas the production and productivity are **increasing** in the district.

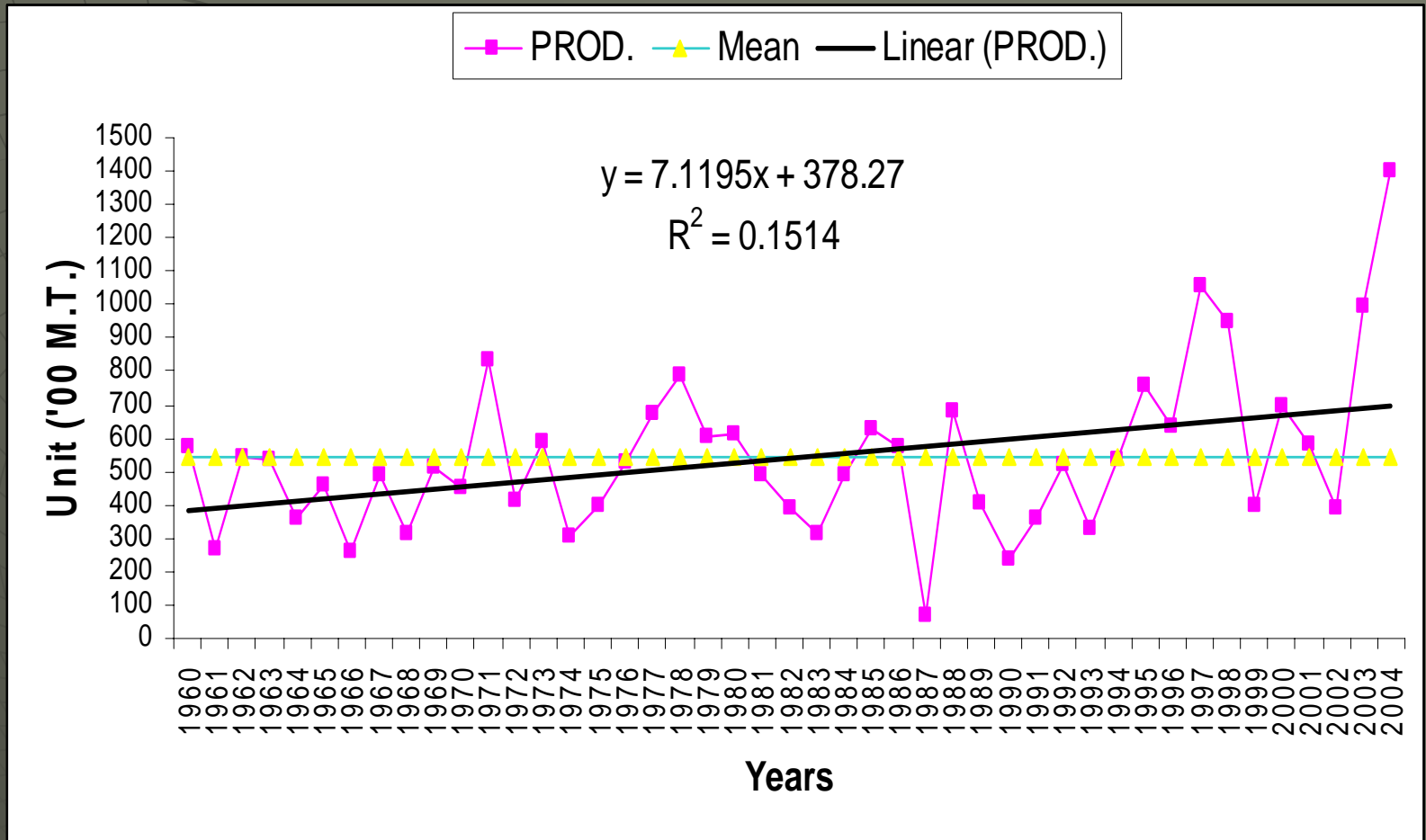


# Area, production and productivity of cotton and groundnut

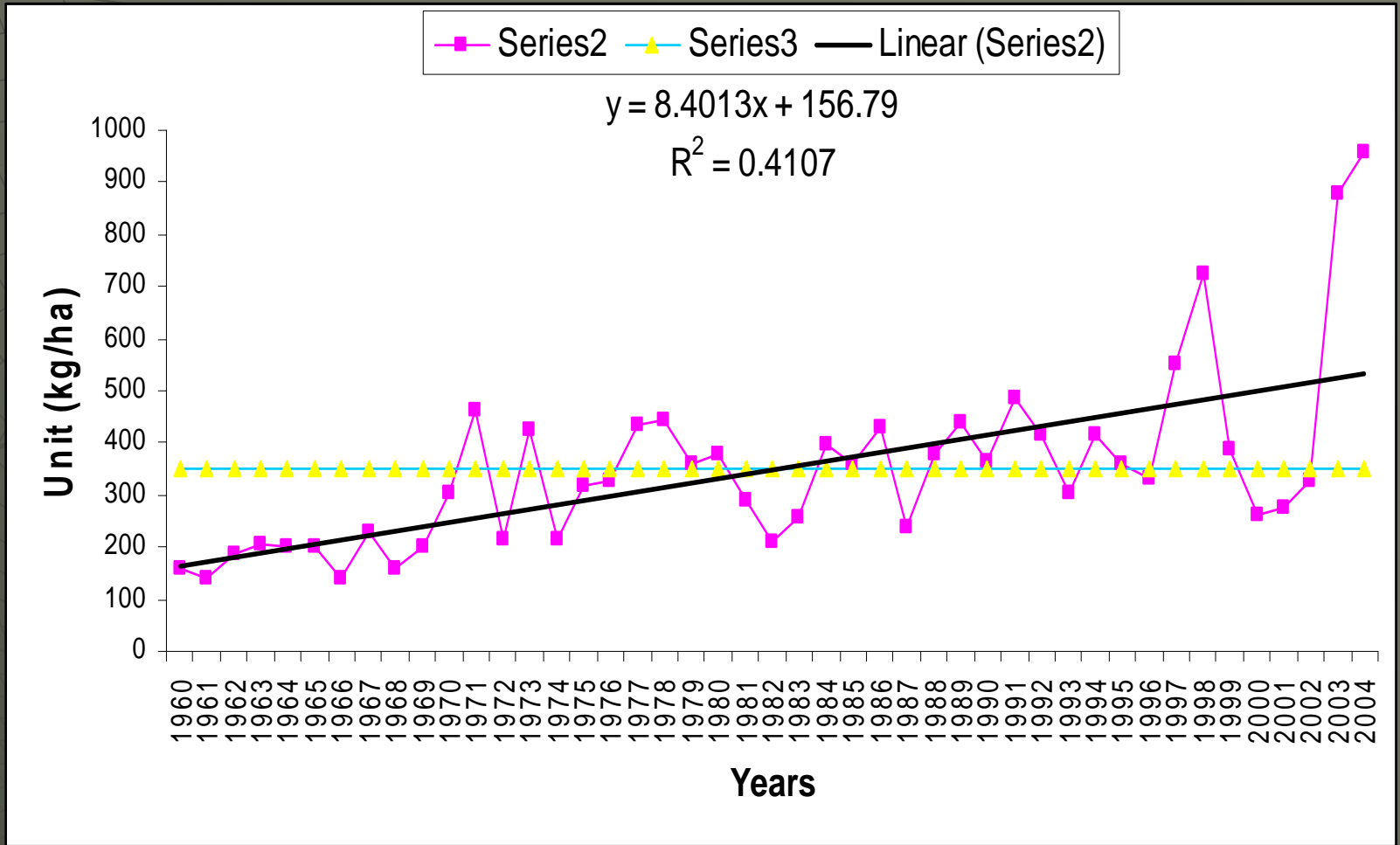
| Particulars          | Cotton |     |      | Groundnut |       |      |
|----------------------|--------|-----|------|-----------|-------|------|
|                      | Mean   | SD  | CV % | Mean      | SD    | CV % |
| Area (00 ha)         | 316    | 117 | 37   | 3732      | 563.5 | 15   |
| Production (00 MT)   | 542    | 238 | 44   | 4146      | 2157  | 53   |
| Productivity (kg/ha) | 350    | 170 | 49   | 1079      | 449   | 46   |



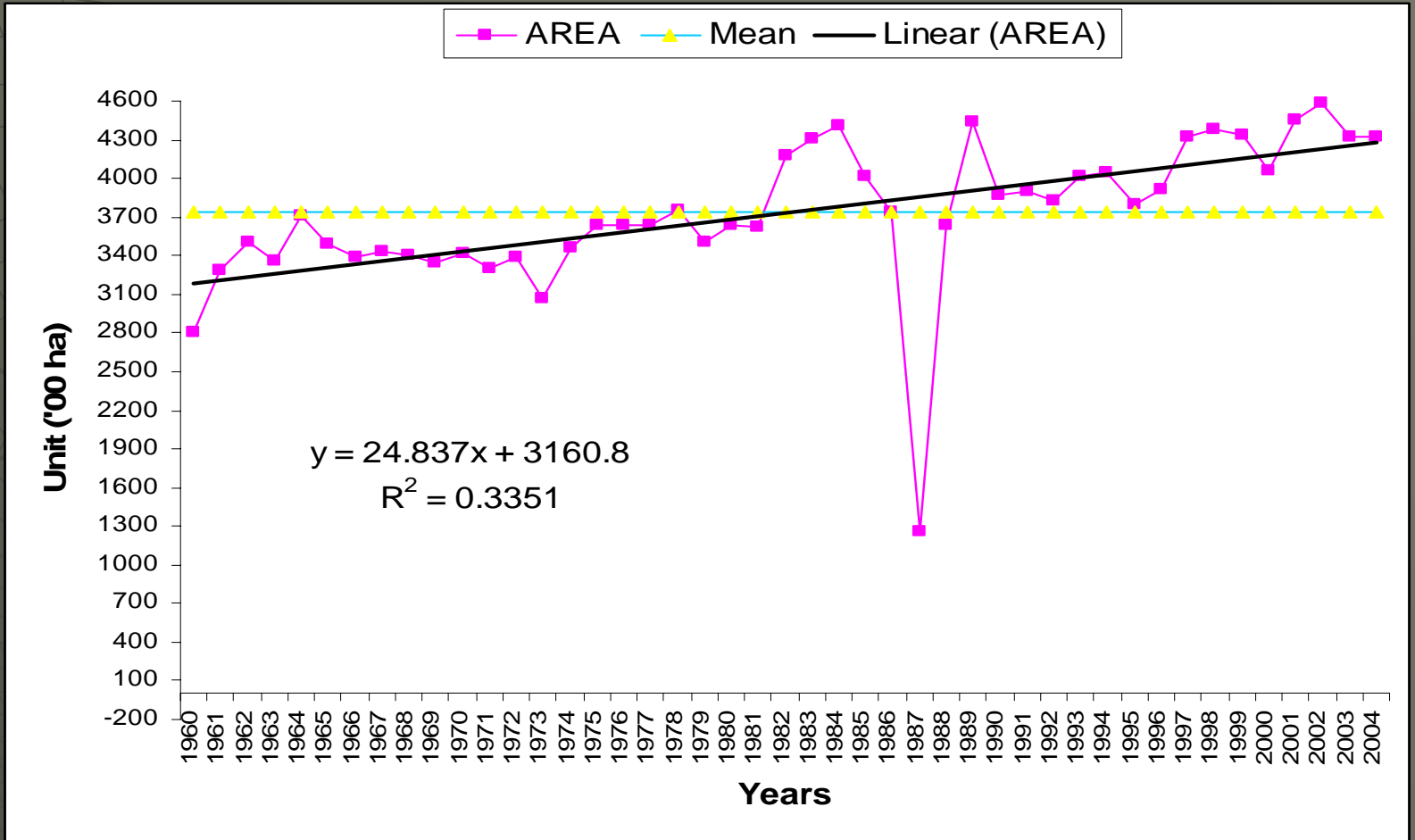
Trend line for area under cotton in Junagadh district



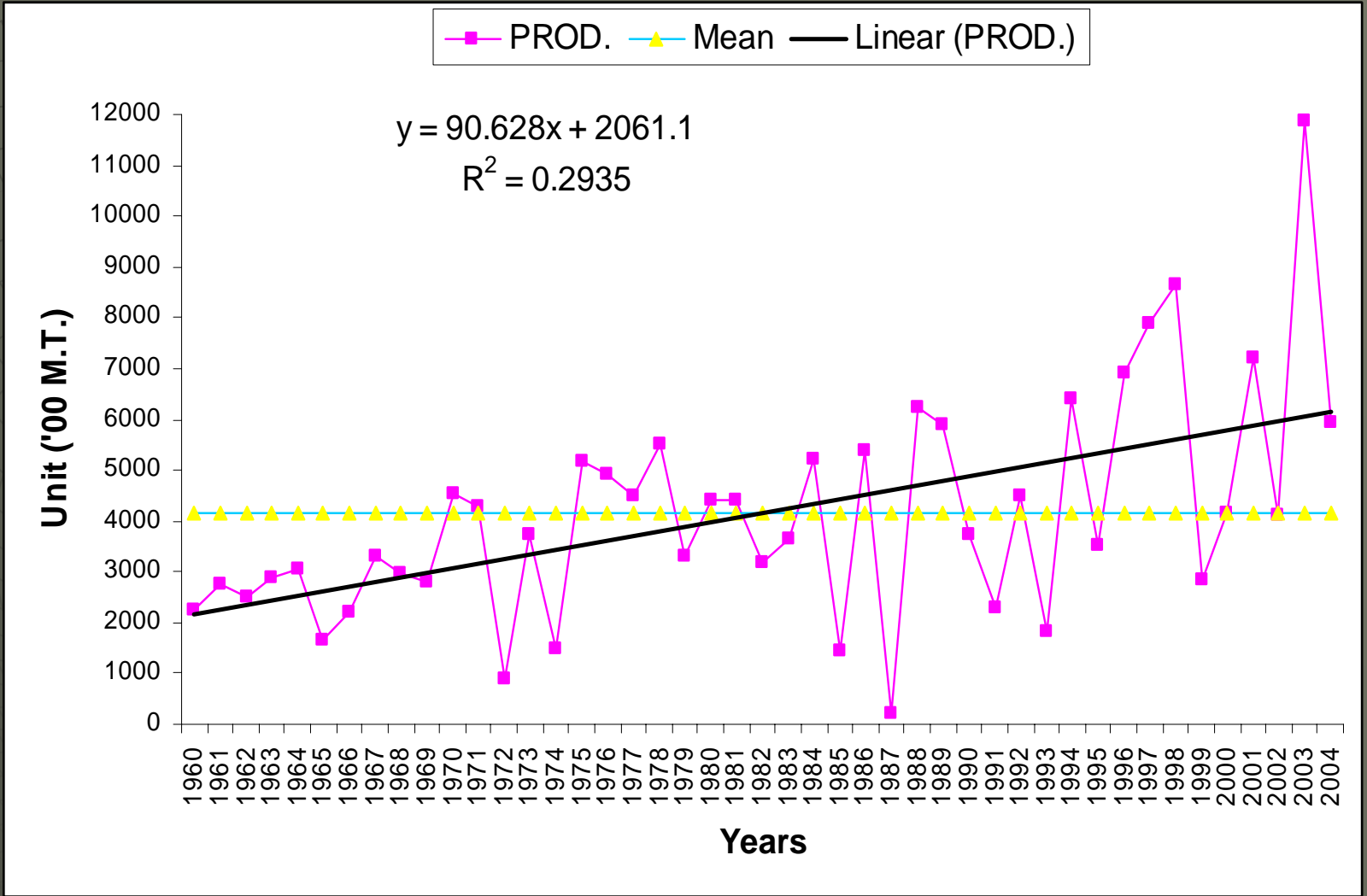
Trend line for production under cotton in Junagadh district



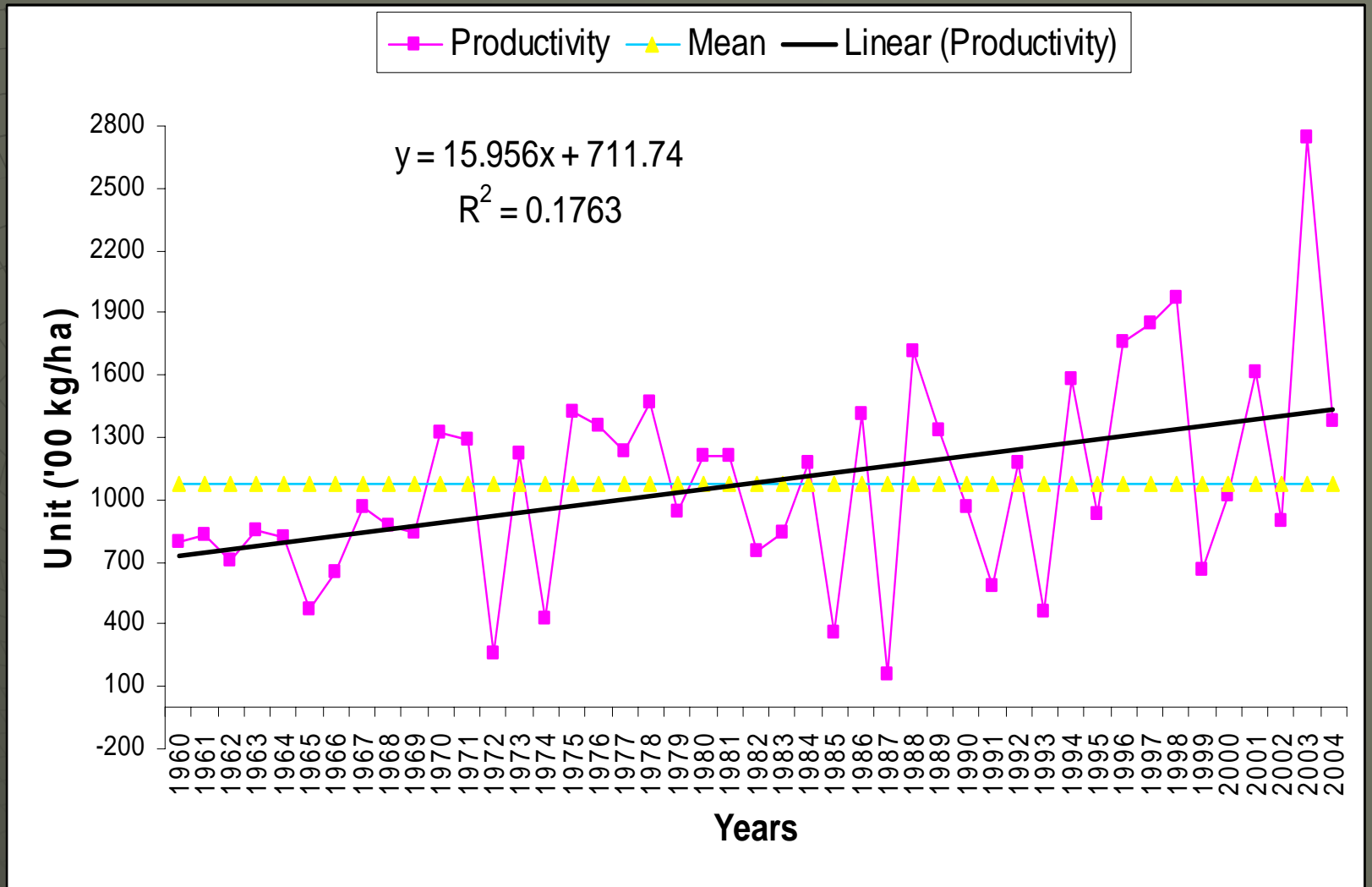
Trend line for productivity under cotton in Junagadh district



Trend line for area under groundnut in Junagadh district



Trend line for production under groundnut in Junagadh district



Trend line for productivity under groundnut in Junagadh district

## Relationship between rainfall and crop yields

| Month     | Cotton | Groundnut |
|-----------|--------|-----------|
| June      | 0.018  | 0.094     |
| July      | 0.010  | 0.356*    |
| August    | 0.203  | 0.233     |
| September | 0.394* | 0.241     |
| Seasonal  | 0.192  | 0.381*    |

- \* The positive correlations between rainfall and crop yields were observed.
- \* Significant correlation of groundnut yield with seasonal and monthly rainfall could be obtained with the decreasing trend of rainfall in the month of July and increasing trend in the subsequent months.
- \* The cotton yield showed significant correlation with the September rainfall. The September rainfall is increasing over the years.





# CONCLUSION

- The study highlighted the trend of rainfall and temperature during monsoon season in Junagadh region. Results reveal that the rainfall tends to decrease in June, July and on seasonal over the period of 45 years. The increasing trend of rainfall in August and September indicates shifting of monsoon season over Saurashtra region.
- The temperature trend analysis divulges that the maximum and minimum temperatures were decreasing in monsoon months. However, the annual mean minimum temperature is increasing in the region.
- Cotton and groundnut are major crops of Gujarat and Saurashtra in particular. Area, production and productivity of groundnut are in the increasing trend, whereas, the production and productivity of cotton are in the increasing mode against the decreasing trend of area in Junagadh district.

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**Thank You**