# Yield, Labour Use, and Hybrid Cocoa Adoption in Ahafo Ano South-West District, Ghana

**Emmanuel Tetteh Jumpah[1], Tomas Ratinger[1] , Miroslava Bavorova[1], Bernard K. Essel[1]**

*[1] Department of Economics and Development, Czech University of Life Sciences Prague*

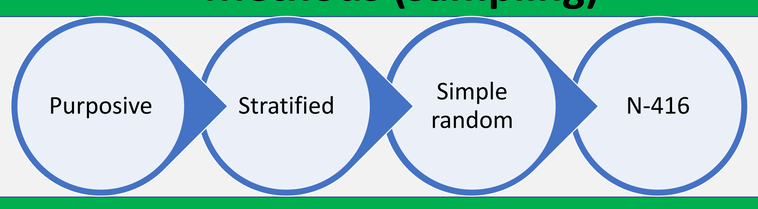
## Introduction

- Hybrid cocoa varieties are known to have better yields than traditional varieties. However, adoption of hybrid cocoa is a low and poor yields remain a major challenge for cocoa production in Ghana.
- To maximise cocoa yield, adoption of improved varieties is critical. However, labour for weeding, agrochemical application and pruning is important to ensure the adoption of hybrid cocoa.

## Objectives

- Analyse the effect of hybrid cocoa adoption on yield.
- Investigate the effect of hybrid cocoa adoption on labour use.

## Methods (sampling)




## Methods (study area)

Ahafo Ano South-West. Population: 65,770 (77% rural households). Area: 1190.7 km$^2$. Agriculture employs 75% of the working population. Soil (Fertile loam), rainfall (150-170cm per annum), temperature (19-38 $^oC$)

Fig 1. Map of Ghana, showing Ahafo Ano South-West

## Methods (Analytical framework)

Ordinary Least Square (OLS) Binary logistic Regression (BLR)
Seemingly Unrelated regression (SUR)

## Results


**Tab 2**. OLS and BLR of the factors influencing yield and hybrid cocoa, respectively.

| | Yield (N=412); $R^2$=0.427 Prob > F (0.000) | | Hybrid cocoa (N=412)' P. $R^2$ (0.271) Prob > F (0.000) | |
|---|---|---|---|---|
| | β | p-value | β | p-value |
| Yield | - | - | 0.003(0.001) | 0.030 |
| Household size | 35.768(17.641) | 0.043 | 0.004(0.115) | 0.970 |
| Education | 14.478(5.786) | 0.013 | 0.037(0.039) | 0.340 |
| Experience | 1.091(1.274) | 0.393 | -0.041(0.019) | 0.034 |
| Farm size | -32.649(7.048) | 0.000 | -0.020(0.054) | 0.710 |
| Income | 0.012(0.004) | 0.003 | 7.80E5(4.4E5) | 0.078 |
| Extension | 49.95(40.926) | 0.223 | 0.997(0.483) | 0.039 |
| Hybrid cocoa | 139.806(40.851) | 0.001 | - | - |
| SAP training | 19.37(13.989) | 0.167 | -0.445(0.178) | 0.012 |
| Off farm work | -275.037(89.285) | 0.002 | -0.87(1.088) | 0.424 |
| In group savings | -303.289(41.57) | 0.000 | 0.98(0.549) | 0.075 |
| Labour | 5.725(2.45) | 0.020 | 0.092(0.029) | 0.002 |

NB. Only significant values are reported.

**Tab 3**. Result of SUR of factors influencing yield and hybrid cocoa.

| | Yield (N=412); P. $R^2$ (0.414) $\chi2$> P (0.000) | | Hybrid cocoa (N=412); P. $R^2$ (0.189) $\chi2$> P (0.000) | |
|---|---|---|---|---|
| | β | p-value | β | p-value |
| Yield | - | - | 3.53E4(5.47E5) | 0.000 |
| Household size | 34.767 (8.811) | 0.000 | -0.005(0.010) | 0.593 |
| Education | 13.109 (3.250) | 0.000 | 0.005(0.004) | 0.214 |
| Experience | 1.860 (1.511) | 0.218 | -0.006(0.001) | 0.001 |
| Farm size | -32.292 (3.882) | 0.000 | 0.009(0.004) | 0.060 |
| Income | 0.012 (0.002) | 0.000 | 1.81E7(2.14E6) | 0.932 |
| Extension | 33.926 (48.675) | 0.486 | 0.097(0.055) | 0.079 |
| Hybrid cocoa | 272.712 (42.220) | 0.000 | - | - |
| SAP training | 22.920 (15.211) | 0.132 | -0.032(0.017) | 0.062 |
| Off farm work | --256.483 (83.638) | 0.002 | -.0036(0.963) | 0.711 |
| In group savings | -310.544 (37.199) | 0.000 | 0.157(0.045) | 0.000 |
| Labour | 4.527 (2.142) | 0.035 | 0.007(0.002) | 0.007 |

## Discussions

- Household size, education, income from cocoa sales, labour availability and adoption of improved seedlings (hybrid) positively and significantly increase cocoa yield.
- Farm size, off-farm income, and group savings negatively affect cocoa yield.
- Farm size, cocoa yield, access to extension services, group savings and access to labour positively and significantly influence the adoption of hybrid cocoa varieties.

## Conclusions

- There is a significant correlation between the errors of the yield and hybrid equations, and SUR minimises the SE to provide robust estimates of the two regressions.
- Farm size is significant in determining both yield and adoption of hybrid cocoa.
- Cocoa yield is significantly increased by the adoption of improved hybrid varieties, and access to labour promotes the adoption of hybrid cocoa.

**Acknowledgement**:Ebenezer Donkor provided data for analysis, and the Department of Economics and Development funded Tropentag, 2023 participation.