**Appendix to Chronic Sources of Low Cocoa Production in Ghana: New Insights from Meta-Analysis of Old Survey Data**

#### Note A1. Construction of variables

Farmer age (years)

Across all surveys, this variable was taken as the recorded age of the cocoa farmer whose production information was analyzed (hereafter “actual farmer”). The only exception is for all five GCFSs, where there was no identifier to retrieve the actual farmer’s demographic information from the household roster. In this case, farmer age was taken as the mean age of all household farmers who worked on the cocoa farm of the actual farmer.

Female farmer (dummy)

Across all surveys, this variable takes on a value of unity if the actual farmer is female, zero otherwise. The only exception is for all five GCFSs, for the same reason as above. In this case, this variable takes on a value of unity if more than 50% of all household farmers who worked on the cocoa farm of the actual farmer were female, zero otherwise.

Educated farmer (dummy)

Across all surveys, this variable takes on a value of unity if the actual farmer was ever enrolled in formal education, zero otherwise. The only exception is for all five GCFSs, for the same reason as above. In this case, this variable takes on a value of unity if at least one of the household farmers who worked on the cocoa farm of the actual farmer was ever enrolled in formal education, zero otherwise.

Household size (AE)

Across all surveys, household size in adult male equivalence (AE) was computed by dividing the total energy requirements of the household by 2,250 kcal. The National Academy of Sciences-National Research Council calorie-based scale of AE has been commonly applied in studies in Ghana to quantify household size. The scale recognizes energy requirement differences across age and along gender lines.

Credit (dummy)

Across all surveys, this variable takes on a value of unity if at least one household member applied for a loan or received inputs on credit, zero if not, and two if no credit information was collected in the survey. A value of two was assigned to data drawn from the CLP1, GCFS1, GCFS2, GHFS4, GCFS5, GLSS1, GLSS2, GLSS3, and GLSS4 surveys since they were never collected. In this case, the coefficient on category one is taken as the credit effect in any econometric estimation.

Extension (dummy)

Across all surveys, this variable takes on a value of unity if the actual farmer is in an enumeration area (as defined by the survey) in which at least one farmer reported having received extension services from MOFA or NGO’s. Also, where community information was collected, this variable takes on a value of unity if there was an extension agent or office in that community. This variable also takes on a value of zero if the above conditions are not met. The only exception is for all five GCFSs, where extension information was not collected. Consequently, a value of two was assigned to this value for all GCFS observations. In this case, the coefficient on category one is taken as the extension effect in any econometric estimation.

Land (ha)

Across all surveys, this variable is taken as the farmer recalled land under cocoa, converted to hectares.

Production (kg)

Across all surveys, this value was taken as the farmer recalled quantity of cocoa harvested, converted to kg.

Yield (kg/ha)

Across all surveys, this value was taken as quantity of cocoa harvest divided by land under cocoa.

Family labor (AE)

Across all surveys, family labor was calculated as the total AE attributable to members aged 15 years and older.

Hired labor (man-days)

For all five GCFSs, this variable was taken as the farmer recalled quantity of paid labor in man-days. For CLP1, CLP2, and KIT, this was taken as the farmer recalled expenditure on labor divided by the annual minimum agricultural daily wage (GHC/man-day). For GSPS, input usage was reported at the plot level, thus the quantity of hired labor was taken as the farmer recalled quantity of paid labor in man-days, multiplied by the ratio of cocoa production value to total production value for a given plot. These were then summed for a given farmer. Information on inputs in all seven GLSS’s were collected at the household as expenditures. Consequently, for each cocoa farmer, the expenditure for hired labor was calculated as the respective share of that farmer's cocoa production value in total household crop harvest value; subsequently, these were divided by the annual minimum agricultural daily wage to approximate the man-days of hired labor used.

Fertilizer (kg)

Same as hired labor, the only exception is that, where necessary, the annual price for fertilizer (GHC/kg) was used to convert fertilizer expenditures to kilograms of fertilizer.

Pesticide (Liter)

For GCFS, this was taken as farmer recall value of insecticide and fungicide expenditure divided by the respective sample mean price of insecticide (GHC/ Liter). The remaining surveys follow as in the case of hired labor and fertilizer.

#### Note A2. Counterfactual alternative policy analysis

The TE scores can be taken as the pure technical efficiency, as it measures the performance of farmers relative to the technology available in their region. Thus, it is reasonable to hypothesize that, if the best technology was made available to farmers with high pure technical efficiency, then their production should increase. Consequently, given the estimates of the TGR, TE, and MTE, it is possible to increase the overall production of cocoa in Ghana by improving these scores. Particularly; (1) to improve pure technical efficiency (increase TE), the typical policy will be to educate farmers on good agricultural practices via farmer field schools; (2) to minimize the observed technology gaps (increase TGR), the typical policy will be to distribute technology like improved planting materials and latest fertilizer blends into areas where they are non-existent; and (3) to improve both technical efficiency and minimize technology gaps (increase MTE), the typical policy will be to couple farmer education with technology distribution. Furthermore, given the desired production level, an optimal combination of the above policy alternatives can be formulated via mathematical optimization. In this note, the study presents a model to choose the optimal production enhancing policy that GOG could pursue, given the TE, TGR, and MTE.

The study considers a counterfactual scenario where the policy objective is achieving global standards in terms of mean country yield. The scenario was modeled as:

s.t (A1)

Where, is the pre-policy country mean yield for cocoa in Ghana. Recall that the mean cocoa yield in Ghana is about 23% below the global standard, thus, the desired post-policy country mean yield is . The variables and are the number of farmers, average farm size per farmer, and the pre-policy yield of cocoa in region *r*. The term is the *i*th measure of inefficiency (*i*=1 for TE, *i*=2 for TGR, and *i*=3 for MTE) in region *r.* The objective of the policy is to improve Ghana’s mean yield for cocoa, by choosing the proportion of farmers () to treat for the *i*th type of inefficiency. The constraint , ensures that the policy is productivity improving, and ensures that farmers are treated for only one type of inefficiency. Furthermore, variables assented by ~ are simulated via the Monte Carlo approach to address uncertainties about those values. Particularly, these were simulated 1,000 times such that their simulated values were normally distributed with mean, standard deviation, minimum, and maximum equal to that of their mean annually observed/calculated values. The results are in Table A3.

#### Table A1. Household Level Data Sources for Cocoa Farmers in Ghana (1987-2017)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Survey** | **Season** | **Data source** | **Regions a** | **Sample size** |
| Ghana Cocoa Farmers Survey 1 | 2001/02 | Centre for the Study of African Economies (CSAE) | AR, BA, WR, CR, ER | 418 |
| Ghana Cocoa Farmers Survey 2 | 2003/04 | 479 |
| Ghana Cocoa Farmers Survey 3 | 2005/06 | 457 |
| Ghana Cocoa Farmers Survey 4 | 2005/06 | 645 |
| 2006/07 | 685 |
| 2007/08 | 725 |
| Ghana Cocoa Farmers Survey 5 | 2006/07 | 635 |
| 2007/08 | 698 |
| 2008/09 | 731 |
| 2009/10 | 746 |
| Ghana Living Standard Survey 1 | 1987/88 | Ghana Statistical Service (GSS) | AR, BA, CR, ER, WR, VR | 811 |
| Ghana Living Standard Survey 2 | 1988/89 | 846 |
| Ghana Living Standard Survey 3 | 1990/91 | 61 |
| 1991/92 | 290 |
| Ghana Living Standard Survey 4 | 1997/98 | 610 |
| 1998/99 | 74 |
| Ghana Living Standard Survey 5 | 2004/05 | 272 |
| 2005/06 | 574 |
| Ghana Living Standard Survey 6 | 2011/12 | 265 |
| 2012/13 | 1,363 |
| Ghana Living Standard Survey 7 | 2015/16 | 126 |
| 2016/17 | 756 |
| Ghana Socioeconomic Panel Survey 1 | 2009/10 | ISSER and Economic Growth Center | AR, BA, CR, ER, WR | 486 |
| Ghana Socioeconomic Panel Survey 2 | 2014/15 | 350 |
| Cocoa Livelihoods Program Baseline Survey | 2009/10 | World Cocoa Foundation (WCF) | AR, BA, CR, ER, WR | 735 |
| Cocoa Livelihoods Program Midline Survey | 2012/13 | 743 |
| Survey of Child Labor in the Cocoa Growing Areas | 2008/09 | Tulane University | AR, BA, CR, ER, WR | 398 |
| 2013/14 | 619 |
| Demystifying the cocoa sector | 2015/16 | The Royal Tropical Institute (KIT) | AR, BA, CR, ER, WR | 943 |

a Ashanti=AR, Brong Ahafo=BA, Central=CR, Eastern=ER, VR= Volta, Western=WR

#### Table A2. Spatial and Temporal Dynamics in Selected Variables on Ghanaian Cocoa Farmers and their Production (1987-2017)

|  |  |  |
| --- | --- | --- |
|   | **Farmer** | **Household** |
| Age (years) | Female (dummy) | Educated (dummy) | Size (AE) | Credit (dummy) | Extension (dummy) |
| Annual trend | 0.008\*\*\* [0.001] | -0.002 [0.003] | 0.038\*\*\* [0.003] | 0.003\*\*\* [0.001] | -0.104\*\*\* [0.005] | 0.008 [0.005] |
| Region (base=AR) | 0.000\*\*\* [0.000] | 0.000\*\*\* [0.000] | 0.000\*\*\* [0.000] | 0.000\*\*\* [0.000] | 0.000\*\*\* [0.000] | 0.000\*\*\* [0.000] |
| BA | -0.012 [0.021] | -0.327\*\*\* [0.090] | 0.039 [0.117] | 0.107\*\*\* [0.031] | 0.052 [0.164] | -0.707\*\*\* [0.233] |
| CR | -0.008 [0.023] | -0.520\*\*\* [0.107] | 0.008 [0.120] | -0.062\* [0.034] | -0.260 [0.164] | -0.806\*\*\* [0.214] |
| ER | 0.080\*\*\* [0.021] | -0.123 [0.089] | 0.090 [0.108] | 0.100\*\*\* [0.032] | -0.158 [0.162] | -0.001 [0.188] |
| VR | 0.024 [0.024] | -0.629\*\*\* [0.114] | -0.541\*\*\* [0.202] | 0.086\*\* [0.035] | -1.260\*\*\* [0.245] | -0.098 [0.255] |
| WR | -0.069\*\*\* [0.018] | -0.494\*\*\* [0.086] | 0.394\*\*\* [0.092] | 0.013 [0.028] | -0.223\* [0.127] | -0.625\*\*\* [0.171] |
| Trend by region (base=AR) |  |  |  |  |  |  |
| BA | -0.001 [0.001] | 0.015\*\*\* [0.004] | -0.006 [0.006] | -0.006\*\*\* [0.002] | 0.006 [0.008] | 0.020\*\* [0.010] |
| CR | -0.002\* [0.001] | 0.021\*\*\* [0.005] | -0.005 [0.006] | 0.002 [0.002] | 0.022\*\*\* [0.008] | 0.018\* [0.009] |
| ER | -0.004\*\*\* [0.001] | -0.004 [0.004] | -0.006 [0.005] | -0.006\*\*\* [0.002] | 0.013\* [0.007] | 0.002 [0.008] |
| VR | -0.002 [0.001] | 0.004 [0.007] | 0.017\* [0.009] | -0.005\*\* [0.002] | 0.060\*\*\* [0.013] | 0.003 [0.013] |
| WR | -0.002\*\*\* [0.001] | 0.012\*\*\* [0.004] | -0.020\*\*\* [0.004] | -0.001 [0.001] | 0.022\*\*\* [0.006] | 0.015\*\* [0.007] |
| Source (base=GLSS) |  |  |  |  |  |  |
| GCFS | 0.168\*\*\* [0.005] | -0.001 [0.028] | 1.915\*\*\* [0.030] | 0.224\*\*\* [0.009] | -0.476\*\*\* [0.030] | - |
| GSPS | -0.007 [0.011] | 0.089\* [0.053] | 1.539\*\*\* [0.054] | -0.015 [0.019] | 0.446\*\*\* [0.053] | -0.386\*\*\* [0.060] |
| CLP | 0.285\*\*\* [0.008] | 0.498\*\*\* [0.041] | 1.549\*\*\* [0.043] | 0.052\*\*\* [0.015] | 0.516\*\*\* [0.041] | 0.674\*\*\* [0.052] |
| KIT | 0.113\*\*\* [0.010] | 0.208\*\*\* [0.052] | 1.430\*\*\* [0.054] | 0.268\*\*\* [0.017] | 0.764\*\*\* [0.054] | 0.681\*\*\* [0.051] |
| Tulane | - | - | - | -1.222\*\*\* [0.008] | - | - |
| Constant | 1.758\*\*\* [0.013] | -0.600\*\*\* [0.055] | -1.657\*\*\* [0.067] | 1.158\*\*\* [0.020] | 1.480\*\*\* [0.102] | -0.768\*\*\* [0.114] |
| Sample size | 16,541 | 15,524 | 14,840 | 16,541 | 13,867 | 6,913 |
| R-squared/pseudo-R-squared | 0.774 | 0.023 | 0.336 | 0.367 | 0.101 | 0.082 |
| Model significance | 35700.293\*\*\* | 0.000\*\*\* | 0.000\*\*\* | 8222.675\*\*\* | 0.000\*\*\* | 0.000\*\*\* |
| log likelihood | -1,384.908 | -8,319.906 | -6,713.098 | -10,066.632 | -7,430.480 | -3,735.580 |

Significance levels: \* p<0.10, \*\* p<0.05, \*\*\*p<0.01

Ashanti=AR, Brong Ahafo=BA, Central=CR, Eastern=ER, VR= Volta, Western=WR

#### Table A2. Spatial and Temporal Dynamics in Selected Variables on Ghanaian Cocoa Farmers and their Production (1987-2017) – Continued

|  |  |
| --- | --- |
|  | **Production** |
|  | Land (ha) | Yield (Mt/ha) | Household labor (AE) | Hired labor (man-days/ha) | Fertilizer (kg/ha) | Pesticide (Liter/ha) |
| Annual trend | 0.008\*\*\* [0.001] | 0.015\*\*\* [0.001] | 0.005\*\*\* [0.001] | 0.004\*\*\* [0.001] | 0.001 [0.001] | 0.007\*\*\* [0.001] |
| Region (base=AR) |  |  |  |  |  |  |
| BA | 0.135\*\*\* [0.039] | 0.041 [0.037] | 0.133\*\*\* [0.029] | -0.015 [0.028] | -0.033 [0.025] | -0.016 [0.028] |
| CR | 0.177\*\*\* [0.041] | -0.043 [0.037] | -0.025 [0.030] | -0.070\*\*\* [0.025] | -0.011 [0.026] | -0.050\*\* [0.025] |
| ER | -0.009 [0.035] | 0.106\*\*\* [0.037] | 0.132\*\*\* [0.029] | -0.028 [0.025] | 0.003 [0.024] | -0.006 [0.027] |
| VR | -0.199\*\*\* [0.034] | -0.158\*\*\* [0.031] | 0.151\*\*\* [0.031] | -0.036 [0.034] | 0.029 [0.031] | -0.078\*\*\* [0.024] |
| WR | 0.179\*\*\* [0.034] | -0.007 [0.029] | 0.037 [0.025] | 0.063\*\* [0.028] | -0.046\*\* [0.021] | 0.062\*\* [0.028] |
| Trend by region (base=AR) |  |  |  |  |  |  |
| BA | -0.001 [0.002] | 0.003\* [0.002] | -0.005\*\*\* [0.001] | 0.001 [0.001] | 0.004\*\*\* [0.001] | 0.001 [0.001] |
| CR | -0.012\*\*\* [0.002] | 0.005\*\*\* [0.002] | -0.002 [0.001] | 0.003\* [0.001] | 0.009\*\*\* [0.001] | 0.007\*\*\* [0.001] |
| ER | -0.002 [0.002] | -0.002 [0.002] | -0.006\*\*\* [0.001] | 0.002 [0.001] | 0.006\*\*\* [0.001] | 0.004\*\*\* [0.001] |
| VR | -0.002 [0.002] | 0.007\*\*\* [0.002] | -0.008\*\*\* [0.002] | -0.001 [0.002] | 0.000 [0.002] | 0.004\*\* [0.002] |
| WR | -0.005\*\*\* [0.002] | 0.012\*\*\* [0.001] | -0.003\*\* [0.001] | -0.004\*\*\* [0.001] | 0.014\*\*\* [0.001] | 0.003\*\* [0.001] |
| Source (base=GLSS) |  |  |  |  |  |  |
| GCFS | 0.048\*\*\* [0.010] | 0.245\*\*\* [0.010] | 0.066\*\*\* [0.008] | 0.226\*\*\* [0.010] | 0.270\*\*\* [0.010] | -0.037\*\*\* [0.010] |
| GSPS | -0.193\*\*\* [0.020] | -0.195\*\*\* [0.022] | 0.043\*\*\* [0.016] | 0.058\*\*\* [0.019] | -0.112\*\*\* [0.013] | -0.137\*\*\* [0.017] |
| CLP | 0.052\*\*\* [0.015] | 0.241\*\*\* [0.015] | -0.156\*\*\* [0.015] | 0.147\*\*\* [0.015] | 0.055\*\*\* [0.015] | -0.092\*\*\* [0.013] |
| KIT | 0.301\*\*\* [0.019] | 0.385\*\*\* [0.018] | 0.021 [0.016] | 0.186\*\*\* [0.019] | -0.111\*\*\* [0.017] | 0.110\*\*\* [0.020] |
| Tulane | -0.087\*\*\* [0.017] | 0.035\* [0.019] | -1.292\*\*\* [0.007] | 0.049\*\*\* [0.017] | -0.040\*\* [0.016] | -0.055\*\*\* [0.016] |
| Constant | 0.546\*\*\* [0.023] | 0.325\*\*\* [0.021] | 1.205\*\*\* [0.018] | 0.195\*\*\* [0.019] | 0.032\* [0.017] | 0.123\*\*\* [0.018] |
| Sample size | 16,541 | 16,541 | 16,541 | 16,541 | 16,541 | 16,541 |
| R-squared/pseudo-R-squared | 0.072 | 0.218 | 0.375 | 0.054 | 0.126 | 0.050 |
| Model significance | 91.005\*\*\* | 331.706\*\*\* | 9000.071\*\*\* | 73.460\*\*\* | 160.453\*\*\* | 65.446\*\*\* |
| log likelihood | -12,095.353 | -12,443.476 | -8,909.204 | -11,500.054 | -11,219.765 | -10,791.454 |

Significance levels: \* p<0.10, \*\* p<0.05, \*\*\*p<0.01

Ashanti=AR, Brong Ahafo=BA, Central=CR, Eastern=ER, VR= Volta, Western=WR

#### Table A2. Spatial and Temporal Dynamics in Selected Variables on Ghanaian Cocoa Farmers and their Production (1987-2017) – Continued

|  |  |
| --- | --- |
|  | **Cocoa trees age (ratio)** |
|  | 0-4 years (ratio) | 5-9 years (ratio) | 10-19 years (ratio) | Over 19 years (ratio) |
| Annual trend | 0.020\*\*\* [0.003] | 0.002 [0.004] | -0.020\*\*\* [0.006] | -0.001 [0.006] |
| Region (base=AR) | 0.000\*\*\* [0.000] | 0.000\*\*\* [0.000] | 0.000\*\*\* [0.000] | 0.000\*\*\* [0.000] |
| BA | 0.430\*\*\* [0.085] | -0.154 [0.115] | 0.006 [0.148] | -0.237 [0.159] |
| CR | 0.391\*\* [0.159] | 0.298 [0.318] | 0.053 [0.362] | -0.766\*\* [0.324] |
| ER | 0.315\*\* [0.124] | 0.335 [0.281] | 0.568\* [0.310] | -1.222\*\*\* [0.335] |
| WR | 0.352\*\*\* [0.073] | 0.087 [0.104] | 0.176 [0.130] | -0.556\*\*\* [0.136] |
| Trend by region (base=AR) |  |  |  |  |
| BA | -0.022\*\*\* [0.004] | 0.008 [0.006] | -0.001 [0.008] | 0.013 [0.008] |
| CR | -0.021\*\*\* [0.008] | -0.012 [0.016] | 0.000 [0.018] | 0.034\*\* [0.016] |
| ER | -0.019\*\*\* [0.006] | -0.015 [0.014] | -0.026\* [0.015] | 0.060\*\*\* [0.017] |
| WR | -0.018\*\*\* [0.004] | -0.003 [0.005] | -0.008 [0.007] | 0.026\*\*\* [0.007] |
| Constant | -0.266\*\*\* [0.060] | 0.144\* [0.086] | 0.708\*\*\* [0.109] | 0.344\*\*\* [0.115] |
| Sample size | 5,684 | 5,684 | 5,684 | 5,684 |
| R-squared/pseudo-R-squared | 0.013 | 0.006 | 0.020 | 0.018 |
| Model significance | 11.559\*\*\* | 4.220\*\*\* | 13.814\*\*\* | 13.907\*\*\* |
| log likelihood | 1,640.827 | -598.713 | -1,634.477 | -1,957.983 |

Significance levels: \* p<0.10, \*\* p<0.05, \*\*\*p<0.01

Ashanti=AR, Brong Ahafo=BA, Central=CR, Eastern=ER, VR= Volta, Western=WR

#### Table A3. Regional Level Aging of Cocoa Trees in Ghana from 2003 to 2010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **0-4 years** | **5-9 years** | **10-19 years** | **Over 19 years** |
| **Proportion (ratio)** |
| Ashanti region | 0.120 (0.222) | 0.191 (0.293) | 0.337 (0.373) | 0.352 (0.395) |
| Brong Ahafo region | 0.123 (0.181) | 0.186 (0.274) | 0.320 (0.355) | 0.371 (0.394) |
| Central region | 0.090 (0.152) | 0.252 (0.339) | 0.396 (0.393) | 0.261 (0.350) |
| Eastern region | 0.056 (0.119) | 0.229 (0.299) | 0.378 (0.342) | 0.337 (0.382) |
| Volta region | - | - | - | - |
| Western region | 0.114 (0.197) | 0.227 (0.304) | 0.361 (0.361) | 0.298 (0.375) |
| **Trend (%)** |
| Ashanti region | 16.346\*\*\* [2.661] | 0.958 [2.351] | -6.410\*\*\* [1.743] | -0.345 [1.782] |
| Brong Ahafo region | -1.893 [2.517] | 5.234\*\* [2.141] | -7.054\*\*\* [1.691] | 3.444\*\* [1.628] |
| Central region | -2.033 [8.132] | -4.273 [6.238] | -5.434 [4.671] | 13.198\*\* [6.059] |
| Eastern region | 0.567 [9.613] | -5.882 [5.938] | -13.036\*\*\* [4.059] | 18.545\*\*\* [4.943] |
| Volta region | - | - | - | - |
| Western region | 1.090 [1.862] | -0.450 [1.346] | -8.385\*\*\* [1.076] | 8.814\*\*\* [1.328] |

Significance levels: \* p<0.10, \*\* p<0.05, \*\*\*p<0.01

#### Table A4. Counterfactual Alternative Policy Outcomes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Mean** | **SD** | **Confidence interval** | **Prob** | **Target region(s)** |
| **5th**  | **95th** |
| **Pre-Policy** |   |   |   |   |   |  |
| Global yield (kg/ha) | 424 | 156 | 116 | 626 |   | - |
| Ghana yield (kg/ha) | 340 | 105 | 96 | 438 |   |
| Ghana yield ratio | 0.80 | 0.16 | 0.55 | 1.09 | 12.91 |
| **TE improving policy** |   |   |   |   |   |  |
| Yield (kg/ha) | 413 | 139 | 118 | 563 |   | All regions |
| Yield ratio | 0.97 | 0.22 | 0.66 | 1.37 | 47.22 |
| Ghana production change (%)  | 21.55 | 10.46 | 11.83 | 43.00 |   |
| Global production change (%) | 20.53 | 7.47 | 11.03 | 34.99 |   |
| **TGR improving policy** |   |   |   |   |   |  |
| Yield (kg/ha) | 547 | 236 | 158 | 896 |   | All regions |
| Yield ratio | 1.29 | 0.49 | 0.87 | 2.45 | 84.63 |
| Ghana production change (%)  | 60.86 | 47.46 | 26.99 | 183.19 |   |
| Global production change (%) | 27.17 | 13.56 | 13.92 | 57.78 |   |
| **MTE improving policy** |   |   |   |   |   |  |
| Yield (kg/ha) | 658 | 315 | 194 | 1,151 |   | All regions |
| Yield ratio | 1.55 | 0.68 | 1.01 | 3.16 | 95.38 |
| Ghana production change (%)  | 93.64 | 68.61 | 52.36 | 272.26 |   |
| Global production change (%) | 32.70 | 18.44 | 16.91 | 72.64 |   |
| **Global standard policy** |   |   |   |   |   |  |
| Yield (kg/ha) | 424 | 160 | 121 | 630 |   | 41% of Western |
| Yield ratio | 1.00 | 0.31 | 0.66 | 1.62 | 52.22 |
| Ghana production change (%)  | 24.71 | 26.70 | 7.57 | 89.16 |   |
| Global production change (%) | 21.06 | 8.91 | 11.34 | 39.96 |   |