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**Suvigya Gautam**
Department of Horticulture at Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences Naini, Prayagraj, Uttar Pradesh, India

**Aman Singh**
Department of Horticulture at Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences Naini, Prayagraj, Uttar Pradesh, India

**Corresponding Author:**
**Suvigya Gautam**
Department of Horticulture at Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences Naini, Prayagraj, Uttar Pradesh, India

# Studies on character association for corms yield and it's contributing traits in gladiolus (*Gladiolus grandiflorus* L.)

**Suvigya Gautam and Aman Singh**

**Abstract**
The genetic materials was consisted of eleven gladiolus genotypes *viz.,* White propsparity, Candy man, Friendship pink, American beauty, True yellow, Her majesty, Red majesty, Novalux, Advantage, Sovenior saffron and White friendship Trial shown in a randomized block design (RBD) with three replications was used. Experiment was conducted at Farm of Department of Horticulture at Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences Naini, Prayagraj Uttar Pradesh in *Rabi* season 2019. From the results Corms yield/plant showed significantly and positive correlation with plant height rachis length, floret length, floret diameter, duration of flowering (days), number of corm produced per mother corm, number of cormels/plant, number of corms per hectare and number of cormels/ hectare and vase life indicating that an intense selection for these characters will improve seed yield in Gladiolus

**Keywords:** Correlation, agronomic characters and gladiolus

## Introduction
Gladiolus (*Gladiouls grandiflous* L.) is an important cut flower in domestic as well as export market (Ganesh *et al*. 2014). *Gladiolus* is native to South Africa. Gladiolus has the basic chromosome number n=15. Most member of genus are heteroploids having the very small chromosomes ranging from 2n=30 to 120 (Singh *et al*. 2017). It is one of the most important bulbous crops grown commercially for cut flower, bouquets, floral arrangements, interior decoration and garden display purposes (Lepcha *et al*. 2007). In this regard gladiolus has gained much importance as it is the 'Queen of bulbous flowers'. The latin word 'Gladius' means sword and hence, it is often called as 'sword lily' because of the shape of its leaves (Mishra *et al.* 2014) [10]. India has a long tradition of floriculture. References to flowers and gardens are found in ancient Sanskrit classics like Rigveda, Ramayana and Mahabharata. The social and economic aspects of flower growing were however, recognized much later. With changing life style and increased urban affluence, floriculture has assumed a definite commercial status in recent times and it has emerged as an important horti.-business venture (Kumar *et al.* 2019). It comprises of about 300 species in which 250 are wild and 50 of garden origin. The wild species of gladioli are native to the Mediterranean region, the Middle East, western Asia, Madagascar and (especially) South Africa (Kispotta *et al.* 2017) [5]. Gladiolus can be grown in a particular agro-climatic region all are not suited for cut flower purpose are for garden display or for exhibition purpose **(**Bhujbal *et al*. 2013) [2] Correlation coefficient analysis is a hardy technique, which elaborates the degree and extent of relationship among important plant characters and it provides basic criteria for selection and leads to directional model based on yield and its components in the field experiments. Yet the information it supplies about the nature of association is often incomplete. The present study was undertaken to analysed the association between yield and its attributes in Gladiolus genotypes.

## Methods and Materials
### Location and source of experiment
The present investigation was carried out during Rabi season 2019 at Farm of Department of Horticulture at Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences Naini, Prayagraj Uttar Pradesh. The genetic materials was consisted of eleven varieties namely White propsparity, Candy man, Friendship pink, American beauty, True yellow, Her majesty, Red majesty, Novalux, Advantage, Sovenior saffron and White friendship. The experiment was laid out in Randomized Complete Block design (RCBD) with three replications.

Uniform sized corms of each variety were planted at spacing 40cm × 20cm on plot size of 1.6m ×1.4m. All the recommended package of practices was followed to get a healthy crop.

**Observations**

Investigation was carried out by considering important twenty seven quantitative traits such plant height (cm) 30 DAS, plant height (cm) 60 DAS, plant height (cm) 90 DAS, number of leaves/plant 30 DAS, number of leaves/plant 60 DAS, number of leaves/plant 90 DAS, number of shoot/plant, days for 50% flowering, rachis length (cm), days taken for emergence of flower spike, days taken to show colour of basal floret, number of florets per spike, number of spikes per plant, floret length (cm), floret diameter (cm), duration of flowering (days), number of spikes per meter square, number of spikes/ha, number of corm produced per mother corm, corm diameter (cm), weight of single corm (gm), corms yield/plant (g), number of cormels/plant, cormel diameter (cm), number of corms per hectare, number of cormels/hectare and vase life (days).The Genotypic and phenotypic correlation coefficients were calculated from the phenotypic and genotypic components of variances and co-variances as per the procedure suggested by Fisher (1954) and Al-Jibouri *et al*. (1958) [1].

**Result and Discussion**

Through correlation and path analysis, the nature and extent of association between different characters influencing yield and causes of association can be better understood which helps in formulation of selection criteria for improvement of yield. Estimates of genotypic correlations in general were higher than phenotypic In general directions of phenotypic and genotypic correlations were almost same for the most of the character combinations. A perusal of table -1 and 2 revealed that Corms yield per plant exhibited highly significant and significant. positive correlation with plant height (cm) 30 DAS (0.61**), plant height (cm) 60 DAS (0.57**), plant height (cm) 90 DAS (0.59**), rachis length (cm) (0.82**), floret length (cm) (0.39**), floret diameter (cm) (0.44**), duration of flowering (days) (0.42**), number of corm produced per mother corm (0.90**), number of cormels/plant (0.46**), number of corms per hectare (0.90**) and number of cormels/ hectare (0.46**) and vase life (days) (0.51**) at genotypic level. Similarly at Phenotypic level correlation coefficient analysis revealed that Corms yield/plant (g) exhibited positive significant association with plant height (cm) 30 DAS (0.40**), plant height (cm) 60 DAS (0.46**), plant height (cm) 90 DAS (0.47**), rachis length (cm) (0.47**), number of spikes per plant (0.25*), floret length (cm) (0.26*), floret diameter (cm) (0.41**), duration of flowering (days) (0.34*), number of spikes per meter square (0.25*), number of spikes/ha (0.25*), number of corm produced per mother corm (0.91**), number of cormels/plant (0.37**), number of corms per hectare (0.91**), number of cormels/hectare (0.37**) and vase life (days) (0.38**). Similar finding reported by Verty *et al.* (2017) [19, 20, 21], Kumar *et al.* (2015) [8], Mahajan, *et al.* (2011) [9]. Number of shoots per plant showed positive significant association with number of corms per hectare (0.34*) and number of corm produced per mother corm (0.3462 *). Days for 50% flowering showed positive significant association with days taken for emergence of flower spike (0.92**) and days taken to show colour of basal floret (0.96**). Rachis length (cm) showed positive significant association with number of florets per spike (0.43*), number of spikes per plant (0.58**), floret length (cm) (0.42*), floret diameter (cm) (0.56**), number of spikes per meter square (0.58**), number of spikes/ha (0.58**), number of corm produced per mother corm (0.36*), corm diameter (cm) (0.41*), number of corms per hectare (0.36*) and vase life (days) (0.58**)at Phenotypic level. Number of spikes per meter square showed positive significant association with number of spikes/ha (0.92**), corm diameter (cm) (0.54**), weight of single corm (gm) (0.35*), vase life (days) (0.70**). Number of spikes / ha showed positive significant association with Corm diameter (cm) (0.54**), Weight of single corm (gm) (0.35*) and Vase life (days) (0.70**)**.** Number of corm produced per mot her corm showed positive significant association with Number of Cormels/plant (0.54**), Number of corms per hectare (0.98**) and Number of cormels/hectare (0.54**). Corm diameter (cm) showed positive significant association with Weight of single corm (gm) (0.60**) and Vase life (days) (0.34*). Similar findings proposed by Rashmi and Kumar, (2014) [15]. Rashmi *et al.* (2016) [16], Vanlalruati *et al.* (2013) [17, 18] and Gandhi *et al*. (2020) [3]. Weight of single corm (g) showed positive significant association with Vase life (days) 0.55**. Number of cormels/ plant showed positive significant association with Number of corms per hectare (0.54**), Number of cormels/hectare (0.85**) and Vase life (days) (0.24*). Cormel diameter (cm) showed positive non-significant association with Number of corms per hectare (0.20). Number of cormels / hectare showed positive significant association with Vase life (days) (0.24*) and Corms yield/plant (g) (0.46**). Vase life (days) showed positive significant association with Corms yield/plant (g) (0.51**) at genotypic level. Vase life (days) showed positive significant association with Corms yield/plant (g) (0.38**) at phenotypic level. Similar result reported by Geeta *et al*. (2014) [4], Mishra *et al*. (2014) [10], Patra, and Mohanty (2019) [11], Pattanaik, *et al.* (2015) [12], Pragya *et al*. (2010) [13], Rahul, *et al*. (2012) [14].

**Conclusion**

From the results Corms yield/plant showed significantly and positive correlation with plant height rachis length, floret length, floret diameter, duration of flowering (days), number of corm produced per mother corm, number of cormels/plant, number of corms per hectare and number of cormels/ hectare and vase life indicating that an intense selection for these characters will improve Corms yield in Gladiolus.

**Table 1:** Estimates of genotypic correlation coefficient for 27 Growth characters, Spike yield and vase life with Corms yield/plant (g)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.95** | 0.94** | -0.20 | -0.15 | -0.16 | -0.04 | -0.39** | 0.80** | -0.42** | -0.39** | 0.69** | 0.67** | 0.53** | 0.716** | 0.05 | 0.677** | 0.67** | 0.40** | 0.41** | 0.21 | 0.32* | 0.06 | 0.40** | 0.32* | 0.65** | 0.61** |
| 2 | | 1.00 | 0.93** | -0.21 | -0.16 | -0.17 | -0.07 | -0.40** | 0.83** | -0.43** | -0.40** | 0.66** | 0.68** | 0.52** | 0.69** | 0.04 | 0.68** | 0.68** | 0.37* | 0.44** | 0.23 | 0.29* | 0.07 | 0.37* | 0.29* | 0.66** | 0.57** |
| 3 | | | 1.00 | -0.22 | -0.18 | -0.18 | -0.03 | -0.41** | 0.86** | -0.43** | -0.41** | 0.63** | 0.72** | 0.51** | 0.69** | 0.02 | 0.72** | 0.72** | 0.39** | 0.43** | 0.22 | 0.26* | 0.08 | 0.39** | 0.26* | 0.68** | 0.59** |
| 4 | | | | 1.00 | 0.99** | 0.99** | -0.28* | -0.07 | 0.07 | 0.00 | -0.06 | 0.28* | 0.17 | 0.08 | 0.02 | -0.16 | 0.17 | 0.17 | -0.42** | 0.50** | 0.37* | -0.44** | 0.31* | -0.42** | -0.44** | -0.30* | -0.31* |
| 5 | | | | | 1.00 | 0.95** | -0.29* | -0.04 | 0.09 | 0.02 | -0.04 | 0.36* | 0.23 | 0.07 | 0.03 | -0.16 | 0.23* | 0.23* | -0.43** | 0.49** | 0.36* | -0.40** | 0.26* | -0.43** | -0.40** | -0.26* | -0.32* |
| 6 | | | | | | 1.00 | -0.29* | -0.04 | 0.07 | 0.03 | -0.04 | 0.36* | 0.21 | 0.07 | 0.03 | -0.17 | 0.21 | 0.21 | -0.43** | 0.49** | 0.35* | -0.40** | 0.26* | -0.43** | -0.40** | -0.27* | -0.33* |
| 7 | | | | | | | 1.00 | 0.24* | 0.10 | 0.22 | 0.24* | -0.42** | -0.19 | 0.36* | 0.23* | -0.11 | -0.20 | -0.20 | 0.40** | -0.26* | -0.41** | -0.11 | 0.25* | 0.40** | -0.11 | -0.02 | 0.22 |
| 8 | | | | | | | | 1.00 | -0.55** | 0.97** | 0.99** | -0.45** | -0.31* | -0.27* | -0.40** | -0.21 | -0.30* | -0.30* | -0.37* | -0.21 | -0.37* | 0.23 | -0.64** | -0.37* | 0.23 | -0.33* | -0.63** |
| 9 | | | | | | | | | 1.00 | -0.61** | -0.56** | 0.55** | 0.93** | 0.53** | 0.67** | 0.09 | 0.93** | 0.93** | 0.59** | 0.43** | 0.20 | 0.06 | 0.32* | 0.59** | 0.06 | 0.61** | 0.82** |
| 10 | | | | | | | | | | 1.00 | 0.99** | -0.34* | -0.38** | -0.31* | -0.47** | -0.43** | -0.37** | -0.37** | -0.38** | -0.17 | -0.44** | 0.21 | -0.49** | -0.38** | 0.21 | -0.45** | -0.67** |
| 11 | | | | | | | | | | | 1.00 | -0.42** | -0.27* | -0.24* | -0.40** | -0.30* | -0.27* | -0.27* | -0.33* | -0.15 | -0.40** | 0.24* | -0.59** | -0.33* | 0.24* | -0.33* | -0.60** |
| 12 | | | | | | | | | | | | 1.00 | 0.82** | 0.14 | 0.36* | -0.14 | 0.82** | 0.82** | -0.07 | 0.36* | 0.32* | 0.10 | 0.05 | -0.07 | 0.10 | 0.44** | 0.14 |
| 13 | | | | | | | | | | | | | 1.00 | 0.20 | 0.43** | -0.08 | 0.93** | 0.93** | -0.01 | 0.53** | 0.35* | -0.01 | 0.08 | -0.01 | -0.01 | 0.70** | 0.21 |
| 14 | | | | | | | | | | | | | | 1.00 | 0.93** | 0.23* | 0.20 | 0.20 | 0.14 | 0.65** | 0.52** | -0.17 | 0.18 | 0.14 | -0.17 | 0.58** | 0.39** |
| 15 | | | | | | | | | | | | | | | 1.00 | 0.31* | 0.43** | 0.43** | 0.12 | 0.60** | 0.65** | -0.10 | 0.12 | 0.12 | -0.10 | 0.80** | 0.44** |
| 16 | | | | | | | | | | | | | | | | 1.00 | -0.08 | -0.08 | 0.19 | -0.19 | 0.43** | 0.261* | -0.47** | 0.18 | 0.261* | 0.46** | 0.42** |
| 17 | | | | | | | | | | | | | | | | | 1.00 | 0.92** | -0.01 | 0.54** | 0.35* | 0.00 | 0.08 | -0.01 | 0.00 | 0.70** | 0.21 |
| 18 | | | | | | | | | | | | | | | | | | 1.00 | -0.01 | 0.54** | 0.35* | 0.00 | 0.08 | -0.01 | 0.00 | 0.70** | 0.21 |
| 19 | | | | | | | | | | | | | | | | | | | 1.00 | -0.37** | -0.45** | 0.54** | 0.20 | 0.98** | 0.54** | 0.19 | 0.90** |
| 20 | | | | | | | | | | | | | | | | | | | | 1.00 | 0.60** | -0.37* | 0.19 | -0.37** | -0.37* | 0.34* | -0.12 |
| 21 | | | | | | | | | | | | | | | | | | | | | 1.00 | -0.32* | -0.08 | -0.45** | -0.32* | 0.55** | -0.03 |
| 22 | | | | | | | | | | | | | | | | | | | | | | 1.00 | -0.69** | 0.54** | 0.85** | 0.24* | 0.46** |
| 23 | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.20 | -0.69** | -0.28* | 0.20 |
| 24 | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.54** | 0.19 | 0.90** |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.24* | 0.46** |
| 26 | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.51** |
| 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 |

* and **indicates significance at 5% and 1% level respectively

1. Plant height (cm) 30 DAS
2. Plant height (cm) 60 DAS
3. Plant height (cm) 90 DAS
4. Number of leaves/ plant 30DAS
5. Number of leaves/ plant 60DAS
6. Number of leaves/ plant 90DAS
7. Number of shoot/ plant
8. Days for 50% flowering
9. Rachis length (cm)
10. Days taken for emergence of flower spike
11. Days taken to show colour of basal floret
12. Number of florets per spike
13. Number of spikes per plant.
14. Flore t length (cm) 26. Number of cormels /hectare
15. Floret diameter (cm) 27. Vase life (days)
16. Duration of flowering (days)
17. Number of spike per meter square
18. Number of spike/ hectare
19. Number of corm produced /mother corm
20. Corm diameter(cm)
21. Weight of single corm(gm)
22. Corms yield/plant(gm)
23. Number of cormels/ plant
24. Cormel diameter (cm)
25. Number of corms / hectare

**Table 2:** Estimates of phenotypic correlation coefficient for 27 Growth, Spike yield and Vase life with Corms yield/plant (g)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.00 | 0.98** | 0.95** | -0.19 | -0.14 | -0.15 | -0.02 | -0.32 | 0.73** | -0.30 | -0.33 | 0.55** | 0.46** | 0.46** | 0.53** | 0.00 | 0.46** | 0.46** | 0.31 | 0.3478* | 0.15 | 0.29 | -0.01 | 0.31 | 0.29 | 0.61** | 0.40** |
| 2 | | 1.00 | 0.97** | -0.18 | -0.15 | -0.15 | -0.06 | -0.36* | 0.72** | -0.35* | -0.37* | 0.56** | 0.50** | 0.46** | 0.55* | 0.01 | 0.50** | 0.50** | 0.34* | 0.3771* | 0.17 | 0.27 | 0.01 | 0.34* | 0.27 | 0.62* | 0.46** |
| 3 | | | 1.00 | -0.20 | -0.17 | -0.18 | -0.03 | -0.38* | 0.75** | -0.38* | -0.39* | 0.58** | 0.54** | 0.48** | 0.58** | 0.02 | 0.54** | 0.54** | 0.35* | 0.38* | 0.18 | 0.25 | 0.06 | 0.35* | 0.25 | 0.66** | 0.47** |
| 4 | | | | 1.00 | 0.99** | 0.98** | -0.28 | -0.07 | 0.07 | 0.00 | -0.08 | 0.27 | 0.12 | 0.11 | 0.05 | -0.12 | 0.13 | 0.13 | -0.35* | 0.44* | 0.34 | -0.40* | 0.27 | -0.35* | -0.40* | -0.29 | -0.24* |
| 5 | | | | | 1.00 | 0.99** | -0.29 | -0.06 | 0.08 | 0.02 | -0.06 | 0.34 | 0.16 | 0.11 | 0.06 | -0.13 | 0.16 | 0.16 | -0.38* | 0.44* | 0.34 | -0.37* | 0.24 | -0.38* | -0.37* | -0.26 | -0.27* |
| 6 | | | | | | 1.00 | -0.28 | -0.06 | 0.07 | 0.02 | -0.06 | 0.34 | 0.15 | 0.11 | 0.06 | -0.14 | 0.15 | 0.15 | -0.38* | 0.43* | 0.33 | -0.37* | 0.24 | -0.38* | -0.37* | -0.27 | -0.27* |
| 7 | | | | | | | 1.00 | 0.22 | 0.12 | 0.20 | 0.24 | -0.40* | -0.16 | 0.32 | 0.23 | -0.10 | -0.16 | -0.16 | 0.34* | -0.24 | -0.38* | -0.11 | 0.20 | 0.34* | -0.11 | -0.02 | 0.18 |
| 8 | | | | | | | | 1.00 | -0.44* | 0.92** | 0.96** | -0.40* | -0.26 | -0.24 | -0.34 | -0.23 | -0.26 | -0.26 | -0.32 | -0.13 | -0.29 | 0.21 | -0.48** | -0.32 | 0.21 | -0.30 | -0.49** |
| 9 | | | | | | | | | 1.00 | -0.45** | -0.43 * | 0.43* | 0.58** | 0.42* | 0.56** | 0.09 | 0.58** | 0.58** | 0.36* | 0.41* | 0.20 | 0.05 | 0.24 | 0.3612* | 0.05 | 0.58** | 0.47** |
| 10 | | | | | | | | | | 1.00 | 0.95** | -0.35* | -0.25 | -0.27 | -0.36* | -0.43* | -0.25 | -0.25 | -0.32 | -0.11 | -0.40* | 0.17 | -0.38* | -0.32 | 0.17 | -0.40* | -0.54** |
| 11 | | | | | | | | | | | 1.00 | -0.38* | -0.28 | -0.24 | -0.33 | -0.32 | -0.28 | -0.28 | -0.32 | -0.10 | -0.35* | 0.22 | -0.47** | -0.32 | 0.22 | -0.31 | -0.52** |
| 12 | | | | | | | | | | | | 1.00 | 0.50** | 0.12 | 0.28 | -0.07 | 0.50** | .50** | -0.07 | 0.32 | 0.34 | 0.11 | 0.10 | -0.07 | 0.11 | 0.41* | 0.08 |
| 13 | | | | | | | | | | | | | 1.00 | 0.16 | 0.35* | -0.03 | 0.97** | 0.96** | 0.11 | 0.35* | 0.21 | -0.01 | 0.00 | 0.11 | -0.01 | 0.53** | 0.25* |
| 14 | | | | | | | | | | | | | | 1.00 | 0.83** | 0.20 | 0.15 | 0.15 | 0.08 | 0.57** | 0.46** | -0.17 | 0.19 | 0.08 | -0.17 | 0.51** | 0.26* |
| 15 | | | | | | | | | | | | | | | 1.00 | 0.28 | 0.34* | 0.34* | 0.15 | 0.59** | 0.56** | -0.09 | 0.11 | 0.15 | -0.09 | 0.69** | 0.41** |
| 16 | | | | | | | | | | | | | | | | 1.00 | -0.03 | -0.03 | 0.16 | -0.16 | 0.38* | 0.25 | -0.36* | 0.16 | 0.25 | 0.42* | 0.34* |
| 17 | | | | | | | | | | | | | | | | | 1.00 | 1.00** | 0.10 | 0.35* | 0.21 | -0.01 | 0.00 | 0.10 | -0.01 | 0.53** | 0.25* |
| 18 | | | | | | | | | | | | | | | | | | 1.00 | 0.10 | 0.35* | 0.21 | -0.01 | 0.00 | 0.10 | -0.01 | 0.53** | 0.25* |
| 19 | | | | | | | | | | | | | | | | | | | 1.00 | -0.29 | -0.41* | 0.47** | 0.12 | 0.98 | 0.47** | 0.14 | 0.91** |
| 20 | | | | | | | | | | | | | | | | | | | | 1.00 | 0.58** | -0.35* | 0.24 | -0.29 | -0.35* | 0.33 | -0.05 |
| 21 | | | | | | | | | | | | | | | | | | | | | 1.00 | -0.29 | -0.01 | -0.41* | -0.29 | 0.53** | -0.03 |
| 22 | | | | | | | | | | | | | | | | | | | | | | 1.00 | -0.63** | 0.47** | 1.00** | 0.24 | 0.37** |
| 23 | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.12 | -0.63** | -0.27 | 0.12 |
| 24 | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.47** | 0.14 | 0.91** |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.24 | 0.37** |
| 26 | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 | 0.38** |
| 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | 1.00 |

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