EVALUATION OF SORGHUM (*Sorghum bicolor (L.) Moench*) BACKCROSS NESTED ASSOCIATION MAPPING POPULATIONS UNDER MOISTURE STRESS AT SHERARO, NORTHERN ETHIOPIA

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BY

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A thesis
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DEDICATION

This research thesis is dedicated to my father Mitiku Regassa and my mother Shagu Asmare for teaching me that life is all about struggle with gratefulness.

STATEMENT OF THE AUTHOR

First, I declare that this thesis is my work and all sources of materials used for this thesis work have been acknowledged accordingly. This thesis has been submitted in partial fulfillment of the requirements for MSc. Degree in plant breeding at Jimma University College of Agriculture and Veterinary Medicine and is deposited at the University's Library to be made available to borrowers under rules of the library. I strictly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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ACRONYMS AND ABBREVIATIONS

AB	Advanced Backcross
BCF1	Backcross First Filial Generation
BCNAM	Backcross Nested Association Mapping
IPCC	Intergovernmental Panel on Climate Change
LD	Linkage Disequilibrium
Masl	Meter above sea level.
NAM	Nested Association Mapping
RILs	Recombinant Inbreed lines
SAT	Semi-Arid Tropics
SNNP	Southern Nations and Nationalities People
UNDP	United Nations Development Program me

BIOGRAPHICAL SKETCH

The author was born on 15 April 1975 E.C in A/chomen Woreda, Horo-Guduru Wollega zone, Oromia regional state, Ethiopia. He attend junior, elementary and high school at Gaba-laga, Fincha and Shambu from 1983-1994. Then, He awarded Diploma from 1996-1998 at Holleta A.T.V.E.T college and BSc. Degree awarded from Jimma University College of Agriculture and Veterinary medicine in Horticulture 2002-2003E.C. Then after he worked in Governmental and non Governmental organizations for three years; he joined Ethiopian Institute of Agricultural Research (Assosa Agricultural Research Center) on May 2006, where he served in crop research process. In October 2010, he rejoined Jimma University College of Agriculture and Veterinary Medicine to pursue the degree of masters in Plant Breeding program.

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ABSTRACT

Sorghum is one of the most important cereal crops in Ethiopia. Production and productivity of Sorghum is constrained by frequent drought and prolonged dry spell especially over the last two decades in Ethiopia leading to food insecurity. The aim of the current study was to evaluate BCNAM populations for drought tolerance, analyze the genetics of traits and identify genotypes with desirable drought tolerance traits. The experiment was conducted at Sheraro, Northern Ethiopia. A total 1264 genotypes were evaluated using an alpha lattice design with two replications. Analyses of variance for quantitative characters showed highly significant difference among the progenies ($P < 0.01$) for all traits indicating possibility for selection. Similarly, parental lines also exhibited significant difference ($p<0.05$) for most of the traits except chlorophyll content at flowering, panicle width (cm), grain weight per panicle (g) and number of panicles per plant. Some progenies were early flowering including lines 32 (Teshale x IS14446) (61.525 days), 1226 (Teshale x IS32234) (62.9 days), 1099 (Teshale x IS16044) (64.53days), 749 (Teshale x IS14298 (66.04 days) and 305 Teshale x IS15428 (69.01 days). Whereas, lines 673 (Teshale x IS3583) (79.03 days), 903 (Teshale x IS16173)(77.68 days), 513 Teshale x IS22325 (75.2 days), 911 Teshale x IS16173 (73.73 days), and 37 Teshale x IS14446 (71.74 days) were late flowering. While the best performed progenies in grain yield per panicle were 747TeshalexIS14298 (67.47g), 2 TeshalexIS14446 (63.87g), 107 TeshalexIS14446 (61.03g), 767 TeshalexIS14298 (58.54g) and 1239 Teshalex IS32234 (55.89g) with the average yield of 38.21g per panicle. Traits with high GCV and PCV values such as chlorophyll content at maturity, number of panicle per plant, grain weight per plant and grain yield can be improved by simple selection. Chlorophyll content at maturity, date of 50% flowering, date of 95% maturity, panicle length, shows high heritability values indicate quick and visual selection is possible. Whereas chlorophyll content at maturity, grain filling period and thousand seed weight were exhibited high GAM shows additive gen action. Progenies 747, 479, 2, 702, and 914 were promising genotype for further evaluation. Principal component analysis shows 24.33%, 13.82%, 12.32%, 9.63% and 7.43% of the variation from PC1 to PC5 respectively with the cumulative variance of 67.53%.

Keywords: Sorghum, Drought, BCNAM population

1 INTRODUCTION

Sorghum (*Sorghum bicolor* L. Moench) is a herbaceous annual grass, and a member of the tribe *Andropogoneae* and family *Poaceae* (Paterson *et al*., 2009). It was probably first domesticated in the savanna between Western Ethiopia and Eastern Chad, 5000-7000 years ago (Doggett and Prasada Rao, 1995). Grain sorghum has a chromosome number of 2n=2x= 20 (Poehlman and Sleper, 1995) with a genome size of 730 Mbp (Paterson *et al*., 2009), and predominantly self-pollinating crop. There is an out crossing up to 30% depending on panicle type and nature of genotype and humidity (House, 1985). It is a C4 crop and highly preferred in drought stress areas where other cereal crops fail to adapt (Habyarimana *et al*., 2004). Sorghum is adapted to a wide range of agro-ecological conditions that range from 400-3000 m.a.s.l. (Teshome *et al*., 2007)**.**

It is the fifth most important grain crops in the world, providing food of subsistence for over 500 million people in Africa and South East Asian (Zhanguo X. *et al.,* 2017). The world production of sorghum was 63.5 million tons in 2015 cropping season and cultivated on 44 million hectare from 2006-2008 (Mundia, C.W. *et al*.,2019**)**. In Ethiopia, the crop grows on 1.8 million hectares with a total production of 4.3 million tons/year (CSA, 2015) which makes Ethiopia the seventh largest sorghum producer in the world and third in Africa next to Nigeria and Sudan (Berenji and Dahlberg, 2004) with a contribution of about 12% of annual production. The sub-Saharan Africa produces about 18 million tons of sorghum annually making it the second important cereal crop after maize (*Zea mays L*.) (Mutisya, J. *et al*., 2009). However; the productivity is not satisfactory in Africa where global population will predicted to increase from 7 billion to 9 billion by 2050s at which most of the increase will occur in sub-Saharan Africa, where population growth is among the highest in the world (Haub C., 2013) increasing the risk of food insecurity in this region (UNDP, 2012)**.**

In Ethiopia, sorghum is the third most important crop both in area coverage and tonnage after teff and maize and becoming fourth primary staple food crop after teff, maize, and wheat (Kinfe H. and Tesfaye A., 2018). It is the dominant crop in the dry lowlands which accounts for 66% of the total cultivated area of the country and the national average productivity of sorghum in Ethiopia is 2.7 tons/ha (CSA, 2018). Ethiopian cereal production comprise 78.23% (8.8 million ha) of the field crops which sorghum accounts for 14.41%. The major sorghum producing regions of the country are Oromia at 38.5%, Amhara (32.9%), Tigray (14.1%) and Southern Nations and Nationalities People (SNNP) region (7.6%). Of the annually total sorghum grain production in Ethiopia, about 80% is used for making *injera*, 10% for home-brewed beverages and the remaining 10% goes for making different food products (Geleti *et al*., 2002).

Despite its importance, Sorghum productivity is much lower in Ethiopia compared to 3.8 t/ha in countries like the USA (FAOSTAT, 2012). The low productivity is due to various production constraints including biotic stresses (insects, diseases, birds and weeds), abiotic factors (moisture stress and low soil fertility). Continued use of low yielding traditional cultivars was another issue reducing grain yield in Sorghum (Wortmann *et al.*, 2006). In Ethiopia, 99.6% of the total area under sorghum is covered by traditional cultivars, which are less productive (CSA, 2012 a and b). Among abiotic stresses, drought is the dominant production constraint (Malagnoux M.., 2007**).**

In north western and north eastern parts of the country drought, qualia bird and *Striga* were found to be very important. But drought is a national threat since Ethiopia is situated where 50% of the total area is semi-arid (Nyssen J., *et al., 2004*). One third of the world's land area including in Ethiopia is arid or semi-arid and inhabited by some of the poorest human populations (Malagnoux M., 2007). Indicating the country is covered by more semi-arid tropics than the rest of the countries globally. Whereas, rain-fed agricultural land accounts for 80% of food production and grows about 60% of the world's staple food (FAO, 2008). Around 17% of the global cultivated area was affected by drought during the period 1980-2006. Water stress at the vegetative stage and reproductive stage alone can reduce yield by more than 36%, and 55% respectively (Assefa, *et al*., 2010). In addition to its direct effect on yield, drought also predisposes the crop to other yield limiting factors such as pests and diseases (McBee, 1984).

To tackle this problem efforts have been made for the last half century to develop varieties for moistures stress lowland parts of Ethiopia which focused on the selection of early maturing varieties that can escape drought. Successes were reported by Geremew G., *et al.,(200)* that some varieties such as 76T1#23 gave the highest grain yield (5.88 t ha^{-1}) whereas the landrace with traditional management gave the least (1.9t ha^{-1}) with a productivity gap of 3.98t $^{-1}$ha. Similarly Abduselam *et al. (2018)* reported that Teshale variety gave the highest grain yield of 4 tons ha^{-1} in Eastern Hararghe.

Genetic variability in crops has strong impact on crop improvement programme and conservation of genetic resources (Assar *et al.*, 2005). As Ethiopia is a center of diversity for sorghum (Doggett, 1988). Thus, amount of variability available in sorghum is immense. Genetic variability can be created in nature through hybridization and recombination, mutation, and modification of chromosome number and structure. So, some variability can be easily recognized and classified into distinct non-overlapping classes, while some other kinds of variability occur in a continuum, and cannot be classified into discrete groups (Acquaah, 2007). The application of morphological traits in the analysis of variation continues to be important since data collection does not require expensive technology and such traits are vital informulation and understanding of ideotypes (Banziger *et al.*, 2006).

Being an important crop for food security in the drought prone areas, improving the drought tolerance of sorghum is one of the most important objectives of plant breeders to minimize the yield losses resulting from moisture stress. However; drought tolerance is a complex trait comprising of different mechanisms including stay green, high transpiration efficiency, ability to water extraction by their roots, high harvest index and others. Introgression of such traits to farmer preferred varieties requires a multiple donor parent lines containing these target traits. However; incorporation and mapping of the quantitative target traits is not commonly exploited in our country.

So, association mapping is a popular technique for high resolution mapping of quantitative traits in crop germplasm (Rafalski, 2002) in such kinds of issues. The nested association mapping (NAM) approach (Yu *et al.*, 2008) combines the power of linkage mapping with the resolution of association mapping by crossing a diverse set of lines to a single reference genotype. This population design nests ancestral linkage disequilibrium (LD) within novel recombination events, allowing for imputation of high-density genotypic data from parental lines, high-power and high-resolution mapping and the use of diverse germplasm (Yu *et al.*, 2008). In line with this, a backcross nested association mapping (BCNAM) populations have been developed as part of a sorghum improvement project at Jimma University. Hence, evaluation of these populations under moisture stress conditions was necessary. Therefore, the present study was initiated with the following objectives:

Objectives

- To evaluate the BCNAM populations for drought tolerance and identify potential lines with a combination of desirable drought tolerance traits
- To estimate components of variance, heritability and genetic advance in the BCNAM populations

2. LITERATURE REVIEW

2.1 Origin, domestication and distribution of Sorghum

The origin and culture of sorghum like most other crops, is debating (Martin, 1970). However; it was probably first domesticated in the savanna between Western Ethiopia and Eastern Chad 5000-7000 years ago (Doggett and Prasada Rao, 1995). A complex of wild and weed races of Sorghum *bicolor ssp.* which is termed as *verticilliflorum* believed to be the progenitor of cultivated sorghum (Harlan, 1972). Subjected to selection (both natural and human) and introgression with local wild and weedy types primitive sorghum led to the evolution of cultivated races. Sorghum spread- mostly through traders to other areas: such as India, China and Southeast Asia through the Middle East and to the Americas through West, North and Southern Bantilan Africa (MCS. *et al.*, 2004) From its place of origin . It is now distributed from the sea level to 2200masl and from 50°N in Russia to 40°S in Argentina; while improved cultivars predominate in the Americas, China and Australia, while traditional landraces are grown in large areas of Africa and some countries in Asia (MCS. *et al.*, 2004).

Other scientists justified as sorghum was probably one of the earliest crops to be domesticated in human history. It was an important crop in the old world long before the Christian era (M' ragawa, L.P. and Kanyenji, B., 1987). Dogget (1965a) as cited by House (1985) indicated that archaeological evidence suggested that the practice of cereal production was introduced from Ethiopia to Egypt about 3000 B.C and the possibility of sorghum domestication might have begun about that time, as it was grown during Neolithic times.

Therefore; Grain sorghum [*Sorghum bicolor (L) Moench*] originated in eastern Africa probably in Ethiopia, a region that was characterized by erratic and unpredictable rainfall patterns. It spread by migrating natives to many African countries (Martin, 1970). Sorghum once grew in the wild before it was domesticated as food and feed for human and animals and cultivated in Africa for more than 2000 years long before European colonization. It subsequently spread to Asia and various parts of the western hemisphere by captive slaves (Smith & Frederikson, 2000). Today sorghum is cultivated across the world mostly in the warmer and drier climatic areas. It has been a vital source of food for millions of Peoples in the semi-arid tropics (SAT). Recently; steadily expanding populations and extreme climatic changes have brought increased demands for this dependable staple crop in the SAT, where more than half of the world's sorghum is grown (Omanya *et al.,* 1996)

In Africa, a major growing area runs across West Africa, South of the Sahara, through Sudan, Ethiopia and Somalia. It is also grown in Upper Egypt and Uganda, Kenya, Tanzania, Burundi and Zambia (Dicko *et al*., 2006). In Ethiopia, sorghum is an economically, socially and culturally significant crop grown over a wide range of ecological habitats in the range of 400-3000 m.a.s.l. (Teshome *et al*., 2007). Sorghum is the most important cereal in the lowland areas of the country because of its drought tolerance. The greater concentration of sorghum production comes from north central, northwestern, western and the eastern mid-altitude areas of Ethiopia (Wortmann *et al*., 2006).

2.2 Taxonomic position of Sorghum

The genus Sorghum has 25 recognized species that have been taxonomically classified into five subgenera or sections: *Eusorghum*, *Chaetosorghum*, *Heterosorghum*, *Parasorghum* and *Stiposorghum* (Price *et al*., 2005). *Sorghum bicolor* (L) Moench is a member of the section *Eusorghum* along with *S. propinquum* (Kunth) Hitch. And *S. halepense* (L) Pers. The remaining 4 sections contain 19 species native to Africa, Australia, and Asia (Kuhlman *et al*., 2008). Price *et al.* (2005) had reported species of the genus sorghum have chromosome numbers of 2n = 2x = 10, 20, 30 or 40 of which Sorghum *Bicolor* has 2n = 2x =20**.** Weedy derivatives arising from the hybridization of domesticated sorghum and subspecies *verticilliflorum* make up the subspecies *drummondii*. The intergrades of the subspecies *drummondii* are highly variable due to gene segregation and include shatter cane (a feral form) and Sudan grass.

2.3 Production constraints of Sorghum

The productivity of sorghum in Ethiopia is relatively low with national average grain yield of 2.7t h^{-1} (CSA, 2018). There are various production constraints including abiotic such as drought, low soil fertility (nutrient deficiency), Lack of high yielding varieties and biotic such as stem borers, shoot fly, qualia birds, *Striga hermonthica* and other weeds are recognized as major production constraints in Eastern Africa (Wortmann *et al*., 2006). In Ethiopia, drought and *Striga* were found to be very important in north western and north eastern parts of the country, whereas qualia birds were seen as a major constraint in the Rift Valley and Southwest lowlands (Wortmann *et al.*, 2006).

2.4 Drought as a major constraint in Sorghum production in Ethiopia.

Drought is the availability of inadequate water including precipitation and soil water storage capacity, which inhibits the expression of full genetic potential of the plant (Mitra, 2001). As Ethiopia is situated where more than 50% of the total area is semi-arid (Gamachu, *1977*) and localized in the belt of SAT, insufficient, unevenly distributed and unpredictable rainfall is usually experienced in drier parts of the country. Consequently, in almost all lowland areas crops are prone to recurrent moisture stress in one of at onset or cessation in their growing season since a decade (EARO, 2001). Thus, there is a high coefficient of variability with regard to quantity, quality (amount and distribution of rainfall) at onset or cessation of the cropping season.

The effect of moisture stress on crop yield is dependent on the stage of plant development. Thus; anthesis and grain filling stages appear to be more vulnerable stages may result in reduced yield and/or complete crop failure (Younesi and Moradi, 2009). Drought is one of the major global problems affecting crop production worldwide (Jie *et al.*, 2002).

In the semi-arid tropics, drought is often the main production factor causing a significant yield loss (Matthews *et al.*, 2014). It is defined as a meteorological event during which precipitation is inadequate to meet crop water requirements that results in a loss of yield below that expected under optimal water supply (Thomas, 1997). It is a normal recurrent feature of climate that can occur in virtually all climatic zones; however, its feature varies significantly from region to region. In the semi-arid tropics where dry land farming is practiced, drought is a common phenomenon that occurs at different periods during the growing season (Blum, 1988). There is also a high season-to-season variability of rainfall, temperature and radiation in the tropics. Besides, locations are greatly variable in topographic, soil, existing agricultural practices, and other associated biotic stress factors (Chapman *et al.*, 2000b).

Drought is a combination of temperature (Prasad *et al.*, 2008) and water (Campos *et al.*, 2004) stress effects in which evapo-transpiration is the major driving force that affects the soil, plant and atmospheric continuum of the hydrologic cycle (Kramer, 1983). In earlier studies, predictions of drought were mainly based on the amount and distribution of precipitation (Blum, 2011) but lack of adequate soil moisture or water deficit affects the ability of plants to grow and complete a normal life cycle (Moussa and Abdel-Aziz, 2008). Drought can have major consequences on growth, development and yield of plants by affecting several physiological, morphological and biochemical processes (Simpson, 1981). It is the major cause of poor crop performance and low yield and sometimes it causes total crop failure. In tropics, the probability of drought is highest at the start and end of the growing season.

Drought can occur at both seedling, pre-flowering and post-flowering stages of development and has the most adverse effect on yield (Kebede *et al.,* 2001). Moisture stress at the seedling stage of development will severely affect plant establishment (stand per hectare) (Baalbaki *et al.*, 1999). If it occurs at pre-flowering, flowering, or grain filling stages, it may result in reduced yield, or complete crop failure (Blum, 1996).

Levitt (1980) defined drought resistance as mechanisms of drought avoidance, recovery, survival and tolerance. Researchers have analyzed drought tolerance as pre-and post-flowering stresses and the reaction of genotypes to these stresses are variable and controlled by different genetic mechanisms (Rosenow *et al.,* 1996). Pre-anthesis moisture stress has effects on yield components such as stand count, tillering capacity, number of heads and number of seeds per head, while post-anthesis moisture stress has influences on transpiration efficiency, CO_2 fixation and carbohydrate translocation. The latter in turn, results in low yield and premature plant senescence (Xin *et al.,* 2008).

These drought tolerance mechanisms are associated with plant survival and production. Survival is the ability of the crop to survive drought irrespective of the yield it produces, while production is the ability of the crop to grow and yield under water stress conditions. Drought resistance can affect biomass or economic yield indirectly via water transpired, water-use efficiency, and harvest index (Manavalan *et al.*, 2009). Passioura (1996) defined biomass as the product of the amount of water transpired and water-use efficiency; whereas economic yield is the product of water transpired, water use efficiency and harvest index.

The responses of different plants species and genotypes to drought are variable in relation to developmental stage, duration of drought and evolutionary adaptation of the crop (Sanchez *et al.*, 2002). In sorghum for example, plants that are adapted to arid and semi-arid environments showed higher drought tolerance than plants of humid origin (Blum and Sullivan, 1986).

2.5 Mechanism of drought resistance in plants

According to Mitra (2001) drought resistance is the ability of the plants to produce satisfactory yield under limited soil water or drought stress conditions. In addition, Blum (2005) stated that when a genotype yields better than another under a severe strain of drought, it is relatively more drought resistant. Mechanisms of drought resistance in plants are a process by which crops maintain their growth, development and yield under drought stress conditions and can use one or more mechanisms at a time to tolerate drought stress. Sorghum being the crop of the tropics; it is known for its ability to withstand drought better than any cereal crops. Several studies have been conducted in understanding the mechanism of drought resistance in sorghum and in identifying essential traits for drought tolerance (Blum, 2011). Therefore, drought resistance involves the interaction of different morphological structures, physiological functions and biochemical expressions (Borrell *et al.*, 2006). Sorghum genotypes were found to differ for nearly all recognized drought resistance/tolerance mechanisms such as reduced plant size, short growth duration, leaf rolling, stomatal conductance and stay-green (Blum *et al.*, 1988).

2.5.1 Reduced plant size and growth durations

Reduced leaf area index, small and narrow leaf structure, reduced plant stature, and low tillering ability are reported as drought adaptive mechanisms in plants (Richards *et al.*, 2002). Mortlock and Hammer (1999) reported that larger plants have larger leaf area and transpire more water than smaller plants. In water limited conditions, transpiration loss is first restricted by reduction of leaf expansion (Borrell *et al.,* 2001). Genetic dwarfing of tall genotypes also improves the grain yield potential of sorghum in arid and semi-arid environments. Most drought tolerant cultivars that have been developed through breeding so far are dwarf in stature. Dwarf cultivars are efficient in balancing assimilate translocation between the developing grain and other vegetative organs as compared to tall genotypes (Kouressy *et al.*, 2008b).

Late flowering and continuous increase in height is not a desirable trait in drought prone areas (Rai *et al.,* 1999). A comparative genetic analysis of plant height and time of flowering across the *Poaceae* family revealed that genes affecting these two plant characters are found linked in sorghum (Lin *et al.,* 1995). This largely explained the positive correlation between the two traits. In dry land environments, high tillering is not also a preferred character in sorghum (Ishikawa *et al.,* 2005). All the dwarf sorghum genotypes have low tillering ability. In rice, however, dwarf genotypes are also characterized by their high tillering ability in contrast with sorghum genotypes (Ishikawa *et al.,* 2005).

Short growing duration is considered as an important trait of drought escape (Blum *et al.*, 1988). The advantage of early maturing genotypes in drought affected areas has long been realized by breeders. On the other hand, most studies showed that high yield potential and late maturity are positively correlated under favorable conditions depending on rate of grain filling potential of the genotypes (van Oosterom *et al.*, 2006). So drought escape by shortening the growing period is made at the expense of the crops yield potential (Blum, 1988).

The traditional tall varieties are characterized by extended crop duration (late maturity), moderately high biomass yield and low grain yield under conditions of drought. The dwarf cultivars on the other hand, have reduced biomass yield and relatively high grain yield. Although dwarfing genes contribute to yield improvement, further increase in yield can be achieved through increasing sink capacity by improving assimilate availability through early expression of stay-green traits and delaying leaf senescence (Kouressy *et al.,* 2008a).

2.5.2 Leaf rolling and stomatal conductance

Leaf senescence is a programmed cell death resulting from drought and other environmental stress factors. It is characterized by loss of chlorophyll and progressive decline in photosynthetic capacity (Tao *et al.,* 2000). In plants, stomatal conductance and leaf rolling are found to be reliable physiological indicators of drought tolerance (Kadioglu and Terzi, 2007). They are strongly associated with leaf water potential. Dingkuhan *et al*. (1999) indicated that these two mechanisms are controlled by different factors; as stomatal conductance is controlled by soil moisture dependent root signal, while leaf rolling is controlled by leaf water potential. Hsiao *et al.*, (1984) explained that the strong correlation of leaf rolling with leaf water potential and hence, leaf rolling is used as a visual scoring criterion for selecting drought resistance in plants. The rolling of leaves usually occurs following the reduction in leaf water potential.

Plants with high osmotic adjustment revealed less degree of leaf rolling and hence, less degree of leaf rolling is considered as an indicator of a greater degree of desiccation avoidance through a deep root system (Hsiao *et al.*, 1984). Khan *et al.,* (2007) determined that drought tolerant genotypes in fababean exhibited lower stomatal conductance associated with increased leaf temperature, which gives rise to high transpiration efficiency. It was also suggested that the increased leaf temperature and transpiration rate were due to controlled transpirational cooling system induced by stomatal closure. The drought susceptible genotypes, on the other hand, showed higher stomatal conductance and lower leaf temperature that resulted in lower transpiration rate.

Heckathorn and DeLucia (1991) identified that leaf rolling had positive effects on reducing leaf temperature and loss of water by decreasing the incident irradiation. However, leaf rolling has less value in reducing water loss compared to stomatal closure in the plant species. Although leaf rolling has insignificant effect on transpiration and leaf temperature, it may increase the survival of plants by enhancing stomatal closure in extreme drought conditions (Heckathorn and DeLucia, 1991). The significance of using these traits as a physiological indicator of plant drought adaptive mechanisms depends on the crop species and the environment. In conditions where there are no sophisticated instruments to measure transpiration efficiency and stomatal conductance, leaf rolling is good indicator of drought resistance/tolerance.

2.5.3 Genetics of drought tolerance in sorghum

Drought tolerance is the ability of plants to withstand water deficits and maintain physiological processes even though low tissue water potential develops (Rosenow & Clark, 1981). Drought tolerance mechanisms are associated with plant survival and production. Survival is the ability of the crop to survive drought irrespective of the yield it produces, while production is the ability of the crop to grow and yield under water stress conditions. Several genes are involved in drought stress tolerance in various plant species. The function of these genes is either protecting the cell from water deficit by the production of important metabolic proteins or regulation of genes for signal transduction. The expression of a dehydrin, *dhn1* gene in sorghum as a response to water deficit was reported by Wood and Goldsbrough (1997). Expression and accumulation of *dhn1* gene in seedlings and pre-flowering sorghum was identical among genotypes, but genotypes showed variation in timing of expression of the gene. This suggested that the expression of dehydrins is possibly an important drought adaptation mechanism in sorghum.

The expression of genes related to water deficit in plants is found to be induced by water stress, desiccation, and abscisic acid (ABA). Yamaguchi-Shinozaki *et al.* (2002) also observed wide variation in the timing of induction and expression of drought related genes. The authors classified these genes into two groups; the first groups are responsible for proteins which function directly in stress tolerance, and the second group gives protein factors involved in the regulation of signal transduction and gene expression under drought. Most of these drought inducible gene expressions are induced by ABA. However, various researchers reported the existence of ABA-dependent, and ABA-independent signal transduction cascades between the initial signal of drought stress and the expression of the genes. Furthermore, Shinozaki and Yamaguchi-Shinozaki (2000) suggested that at least two independent pathways exist in plants.

The purpose of studying the genetics of drought resistance in plants is to identify genetic factors that determine the productivity of crops under drought stress conditions. Advances in crop improvement under water-limited conditions are only possible, if drought resistance traits are identified and selected in addition to yield (Borrell *et al.,* 2000a). The quantitative trait loci (QTLs) that have been mapped on the 10 linkage groups of sorghum so far are involved in controlling traits related to yield and yield components, root systems, stay-green, plant height, flowering, and maturity.

Tuinstra *et al.* (1997) identified 13 genomic regions associated with post-anthesis drought tolerance in sorghum. Four QTLs were identified for yield and yield stability, seven for duration of grain development and seed weight, and two for the stay-green trait. A number of traits related to drought resistance have been identified and mapped.

2.5.4 Stay-green or non-senescence

Stay-green, on the other hand is a post-anthesis drought resistance trait in plants that provides resistance to pre-mature leaf senescence to the plant under severe moisture stress condition during grain filling stage. It contributes to an improved yield and yield stability under moisture stress condition. Pre-mature plant tissue death usually occurs when plants are subjected to water stress during the grain filling period in sorghum (Rosenow and Clark, 1983).

Stay-green is associated with a higher level of chlorophyll content, cytokinin, and leaf nitrogen concentration under moisture stress conditions. Thomas and Howarth (2000) reported that stay-green sorghum lines exhibited high levels of cytokinin, suggesting that the reduced senescence rate of the stay-green lines may be due to a higher level of cytokinin. Stay-green genotypes are also associated with higher leaf nitrogen concentration particularly at flowering (Borrell *et al.*, 2000a) and basal stem sugars (Duncan, 1984) than senescent genotypes. This suggests that the stay-green trait may possibly contribute to higher transpiration efficiency of non-senescent genotypes. Greater green-leaf area duration is observed to occur during grain filling stage and, therefore, van Oosterom *et al*. (1996) described that the stay-green as post-flowering green leaf area duration and SPAD meter reading.

The stay-green sorghum lines appear to be the combined effect of many distinct factors namely, green leaf area at flowering, time of onset of senescence, SPAD meter and subsequent rate of senescence (Borrell *et al.*, 2000a). Large variations have been reported in the proportions of green-leaf area among different genotypes as a result of combined effects of differences in onset and rate of senescence (Borrell *et al.*, 2000a). An increase in biomass yield of about 47% more than that obtained from senescent genotypes has been reported in genotypes that express the stay-green trait under post-anthesis moisture deficit (Borrell *et al.*, 2000b). Stay-green improves resistance to diseases and lodging (Tenkouano *et al.*, 1993).

2.6 Genetic variability assessment for drought tolerance

Genetic variability is defined as the variability observed in a given crop plant that can be attributed to genes that encode specific traits and can be transmitted from one generation to the next (Acquaah, 2007). Genetic variability can be created in nature through hybridization and recombination, mutation, and modification of chromosome number and structure. Some variability can be easily recognized and classified into distinct non-overlapping classes, while some other kinds of variability occur in a continuum, and cannot be classified into discrete groups (Acquaah, 2007).

Assessment of genetic variability in crops has strong impact on crop improvement programme and conservation of genetic resources (Assar *et al.,* 2005). Genetic variability can be detected at morphological, biochemical or molecular levels. Some genetic variations are manifested as visible morphological traits (Ayana and Bekele, 1999). The use of qualitative and quantitative morphological traits as techniques for characterization and evaluation of genetic diversity has long been documented and most widely practiced in many crops in general and sorghum in particular (Grenier *et al.,* 2004). The importance of such traits has been influenced by G x E interaction (Newbury and Ford-Lloyd, 1997). However, the application of morphological traits in the analysis of variation continues to be important since data collection does not require expensive technology and such traits are vital informulation and understanding of ideotypes (Banziger *et al.*, 2006).

Some other genetic variations are compositional or chemical that requires various tests for evaluation (Zong *et al.,* 2005) and seed storage proteins (Gepts, 1990) are the most widely used biochemical markers in genetic diversity assessment. Often, the importance of these types of markers is inherently impeded by low polymorphism. The availability of DNA based molecular tools on the other hand, enables breeders to examine genetic diversity at molecular level (Assar *et al.,* 2005). The application of DNA molecular markers as compared to morphological and biochemical markers overcomes the problem of polymorphism and they are highly informative. Furthermore, DNA marker application has facilitated the identification of agronomic traits in wild, traditional and improved germplasm through the dissection of quantitative traits (Tanksely and McCouch, 1997).

Breeding for drought tolerance requires novel sources of resistance (Terán and Singh, 2002). Wild species, traditional varieties, commercial cultivars, and breeding lines are used as sources of genes for drought resistance in most breeding programmes. Bansal and Sinha (1991) suggested exploiting the potential of different species within a crop as a source of resistance. However, Dar *et al.* (2006) advocated the importance of traditional germplasm, as a source of resistance genes for drought in the semi-arid tropics, where moisture stress is the greatest challenge for crop improvement. Blum (2004) also indicated that sorghum is a warm-season and photoperiod sensitive grass that is characterized more by diversity than homogeneity.

Similarly, Habyarimana *et al.* (2004) pointed out that the effect of heterogeneity and heterozygosity of tropical landraces of sorghum enables to display high adaptation to drought stress. Although sorghum has originated in Africa, it spread across wide geographical areas, covering a wide range of latitude, longitude, altitude, day length, rainfall, and temperature

2.7 Breeding for drought tolerance

Generation and selection of new combinations of genes to produce genotypes with superior trait performance than that of the existing genotypes within the target environment is the major objective of plant breeding in these phenomena (Chapman *et al*, 2003). In any breeding programme, defining the critical traits to improve grain yield under a given target environment is critical (Fernandez, 1992). Identification of important traits depends on the degree of influence of a trait on yield, expression of the trait at whole plant level, the nature of the target environment such as rainfall amount, distribution, onset and cessation, available soil water, nutrient status of the soil, and diseases, and economic environment (the necessity of grain quality and quantity).

In breeding for drought tolerance pure line selection method has been used in many national and regional sorghum improvement research programmes in Africa and Asia. However; pedigree and bulk selection methods are commonly used in most international and national breeding institutions (Acquaah, 2007).

Backcrossing is the appropriate and dominant breeding strategy, if the transfer of few traits relating to drought resistance to a high yielding cultivar is required (Mitra, 2001). This experiment also aimed as to transfer important drought tolerant/resistance trait from an elite variety in repeated backcross breeding methods.

Drought tolerance is a complex quantitative trait influenced by many genetic and environmental factors (Ceccarelli *et al.,* 2004). Thus; economic yield is raised indirectly through water transpired, water-use efficiency, water extraction via their roots and harvest index (Manavalan *et al*., 2009). Incorporation and selection of these combinations of genes to produce genotypes with superior trait performance than that of the existing genotypes within the target environment is the major objective of plant breeding when multi target genes is required via backcross breeding (Chapman *et al.*, 2003).

2.8 Backcross breeding

Backcross breeding is an effective method to transfer one or a few genes controlling a specific trait from one line into a second usually elite breeding line. The parent with the desired trait, called the donor parent, provides the desired trait and may not perform as well as an elite variety in other areas. The elite line, called the recurrent parent, usually performs well in all other areas (Matthew R., 2012)

The advanced backcross (AB) technique was developed to incorporate precious genes in donor parent for mapping and cultivar improvement (Tanksley and Nelson, 1996). The component parents (donor parent) selected for a trait share a common parent (recurrent parent) by backcross nested association mapping population method.

The technique was developed to address the difficulties of using component parent for trait mapping and cultivar improvement (Tanksley and Nelson, 1996). AB populations are comprised of multiple parent-backcrosses derived RILs, with an exotic donor parent crossed to an adapted recurrent parent with a much smaller portion of the exotic genome present in each line, the effects of agronomically-unaddapted alleles are reduced, allowing estimates of the value of exotic alleles in the context of cultivated germplasm. AB populations have been developed and used successfully to identify beneficial alleles in several crops, including tomato, rice, wheat, maize and cotton (Wang and Chee, 2010).

The nested association mapping (NAM) approach (Yu *et al.*, 2008) combines the power of linkage mapping with the resolution of association mapping by crossing a diverse set of lines to a single reference genotype. This population design nests ancestral linkage disequilibrium (LD) within novel recombination events, allowing for imputation of high-density genotypic data from parental lines, high-power and high-resolution mapping, and the use of diverse germplasm (Yu *et al*., 2008).

2.9 Genetic parameters

Variability is the happening of differences between individuals due to differences in their genetic composition or environment in which they are raised (Allard, 1960). The degree of variation is measured and expressed as the variance, in which components are subdivided in to: the genotypic variance, which is the variance of genotypic value and the environmental variance, which is the variance of environmental deviation.

2.9.1 Phenotypic and genotypic variations

The phenotypic variance, or the variance of phenotypic values, is the total variance, and is the sum of the genotypic and environmental variance components. The subdividing of the variances into components allows us to estimate the relative importance of the various determining factor of the phenotype, particularly the role of heredity versus environment; the relative importance of heredity in determining phenotypic value is called the heritability of character (Falconer, 1989).

Yadav (2015) studied that the genetic variability of F2 barley populations and he found that high degree of genotypic and phenotypic coefficient of variation for a traits such as tillers per plant, spike per plant, grain yield per plant, flag leaf area, 1000 grain weight, grain weight per spike, and husk content. According to Insan *et al*. (2016) report, the RILs F5 showed significant different in the traits such as grain filling period, plant height, leaf number, panicle length, circumference of the panicle, panicle weight, and grain weight per panicle and RILs F5 have higher yield than the two parents and are uniform with lower within line variance.

Bheemashankar (2007) evaluated nature and magnitude of genetic variability, genetic diversity for yield and grain mold traits and their contribution among 154 sorghum F3 progenies each of resistant x susceptible crosses including parents and checks and reported that the characters grain yield per plant and 1000 grain weight were showed high GCV and PCV.

Ayana and Bekele (2000) reported that there was significant phenotypic variation for plant height, days for 50% flowering, peduncle exertion, panicle length and width, number and length of primary branches per panicle and thousand grain weight among 415 sorghum accessions. Similarly, Bello *et al*. (2007) reported higher values of genotypic variance for plant height, number of grains and grain weight per panicle. Legesse (2007) and Mahajan *et al*. (2011) showed that the magnitude of PCV and GCV were more or less similar and were high for days to maturity, number of leaves per plant, head weight, 100 grain weight, and yield per plant showing that these characters are less affected by environmental fluctuations and might offer scope for selection.

2.9.2 Heritability

Heritability in broad sense is the ratio of the genotypic variance to the phenotypic variance and it can also be defined as a quantitative measure which provides information about correspondence between genotypic variance and phenotypic variance. The broad sense heritability expresses the proportion of the total variance that is attributable to the average effects of genes, and is useful if interest is in relative importance of genotype and environment in the determination of phenotypic value. It is a proportion ranging from 0 to 1.0 or in percentage from 0 to 100. A heritability of 0 means that genes do not contribute to individual differences in the trait, while a heritability of 1.0 means that trait variance is due mainly to heredity (Dabholkar, 1992).

Highest heritability for vegetative traits such as plant height and inflorescence length was estimated and moderately high values for grain weight and days to flowering whereas low heritability for grain yield was observed (Kenga *et al.,* 2006). High heritability coupled with high genetic advance was observed for plant height in F3 sorghum population (Bheemashankar, 2007). Deepalakshmi and Ganesamurthy (2007) reported high heritability for days to 50% flowering, number of grains per panicle, head weight, plant height and grain yield per panicle. Similarly, Mahajan *et al., (*2011) observed High heritability coupled with high genetic advance for the same traits.

The broad sense heritability values of all studied characters were reduced from filial to filial in three segregating populations according to pedigree selection which increases of homogeneity of plants (Ahmad, 2016). High heritability together with high genetic advance was recorded for tillers per plant, grain yield per plant, grain weight per spike, and plant height suggesting that these traits are highly heritable and governed by additive gene (Yadav, 2015). The characters that have broad genetic variability and high heritability estimate in the advanced generation of single seed decent (SSD) indicate that the characters are influenced by additives gene action. High heritability was observed for days to fifty percent flowering, days to physiological maturity and moderate heritability for number of leaves (Tomar *et al*, 2012). Legesse (2007) observed high heritability estimate for number of leaves per plant, plant height, and 100 grain weight and head length.

2.9.3 Genetic advance

Genetic advance measures the expected genetic progress that would result from selecting the best performing genotype for a given character. It indicates the improvement of the performance of the selected genotype over the original. It is an indicator for the genetic improvement made in a population under selection (Allard, 1960).

Tomar *et al.*, (2012) reported that moderate genetic advance as percentage of mean was observed for days to fifty percent flowering (16.01 percent), number of leaves (11.32) and low genetic advance attributable to non-additive gene action was noticed for days to maturity (7.92). High genetic advance (GA) was observed for number of days to flowering, weight of grains per panicle, and days to maturity (Nyadanu and Dikera, 2014).

2.9.4 Principal component analysis

Principal component analysis (PCA) is one of the multivariate statistical techniques which are a powerful tool for investigating and summarizing underlying trends in complex data structures (Legendre and Anderson, 1999). Principal component analysis reflects the importance of the largest contributor to the total variation at each axis for differentiation (Sharma, 1998).

PCA can be used to drive a two dimensional scatter plot of individuals, such that the geometrical distance among individuals in the plot reflect the genetic distances among them with minimal distortion. Aggregates of individuals in such a plot will reveal sets of genetically similar individuals.

The resulting diagram can give the researcher an idea about the correctness and inference of cluster analysis results (Bensmail *et al*., 1997). This will allow visualization of the differences among the individuals and identify possible groups. The first step in PCA is to calculate eigen values, which define the amount of total variation that is displayed on the PC axes. The first PC summarizes most of the variability present in the original data relative to all remaining PCs. The second PC explains most of the variability not summarized by the first PC and uncorrelated with the first and so on (Joliffe, 1986). The eigenvectors determine the directions of the new feature space and eigenvalues measure the amount of variation in the total sample accounted for by each factor.

Nyadanu and Dikera, (2014) reported the first principal component (PC) clarified 99.95% of the total variance. As indicated by Desmae *et al.* (2016) primary components examination demonstrated that the former five components with eighteen values more than one explained 71% of the variability among the landraces.

The primary component was correlated essentially with days flowering and maturity, leaf number and leaf length. Abraha *et al.* (2015) additionally reported that the principal component (PC) investigation demonstrated that out of the seven the first 4 clarified larger PCs of the total variety. These four PCs with eighteen value >1 contributed 74.6% of the total variation among the sorghum genotypes. The most overbearing characteristics having higher inducement in PC1 were days of 50% flowering, days of 95% maturity, panicle exertion and panicle length. Additionally, the PCII was because of the variance in sorghum genotypes of grain yield. The PC III was clarified basically by variance of plant height, panicle exertion and panicle length.

3. MATERIALS AND METHODS

3.1. Description of the study area

The field experiment was conducted at Shire-Metsebry Agricultural Research substation Sheraro, North Western Ethiopia in 2018 cropping season. Sheraro is located at 1024 km North West of Addis Abeba at altitude of 1006 m.a.s.l., 14^{o} 24' 00'' N latitude, 37^{o} 56' 00'' E longitude. The area is characterized as hot to warm semi-arid low land plains, with a Mono-modal rainfall pattern. There were high variability of rainfall between different years and more of the annual rainfall was received in July and August. Total annual rainfall of the year 2018 was 234.13mm. But during the growing season (i.e. July to November) the total rain fall was 186.23mm (i.e. 65.34mm on July, 107.09mm on august, 7.00mm on September, 6.00 mm on October and 0.80mm on November) (National Meteorological Agency 2018).

According to national meteorological agency Mekelle branch 2018, the maximum average temperature of the area during warmer season was 34 ^{0}C and the minimum during cold season read 25^{0}C. During the growing season (i.e. from July to November) maximum temperature were recorded in September 32^{0}C, October 33^{0}C, November 31^{0}C whereas, the minimum temperature was recorded on august 29^{0}C. Soil Physical and Chemical Properties of the study area was P^{H} is 7.16 neutral (FAO, 2016), the particle distribution of the soil is Sand 14 %, Silt 21%, Clay 65%. So the majority of the textural class is clay USDA (1987)

3.2 Experimental materials

The experimental materials used consisted of 1264 BCNAM population, parent lines and one Standard check (Dagnew). The BCNAM population (BC1F5) was developed by sorghum improvement project at Jimma University College of Agriculture and Veterinary Medicine from the crosses of an élite variety (Teshale) as female(recurrent parent) and other thirty component parents Lines (donor parents) (IS2205, IS3583, IS9911, IS14556, IS16044, IS16173, IS22325, IS32234, IS10876, IS14298, IS14446, IS15428, IS23988) were used as male. Teshale variety was used as the sources of adaptive high yielding variety, but susceptible to drought stress. It was a recurrent parent that all the F1 of donor parents were back crossed to it and evaluated for the trait and selfed every year for next generation.

Whereas, the donor parent lines were ICRSAT materials selected for unique drought tolerant trait such as high water extraction capacity, transpiration use efficiency and high harvest index (Manavalan *et al*. 2009). Thus, the aim was to incorporate those important traits to their progenies and evaluating for drought stress.

Table 1. Target trait derived experimental materials (BCNAMP) used during 2018 cropping season at sheraro

No	BCNAMP	Target trait	Population Number
1	Teshale*IS2205	H2O extraction ability	43
2	Teshale*IS3583	TE	123
3	Teshale*IS9911	HI	86
4	Teshale*IS14556	TE	39
5	Teshale*IS16044	TE	46
6	Teshale*IS16173	TE	118
7	Teshale*IS22325	TE	128
8	Teshale*IS32234	HI	30
9	Teshale*IS10876	HI	143
10	Teshale*IS14298	HI	138
11	Teshale*IS14446	H20 extraction ability	154
12	Teshale*IS15428	TE	145
13	Teshale*IS23988	H20 extraction ability	56
14	Teshale (recurrent parent)	Elite adaptive Variety	1
15	Check (Dagnew)	standard	1
Total	1249 progenies+14parent+1check=1264 BCNAM population		

Key: H_2O extraction= water extraction ability by their roots

TE= Transpiration use efficiency

HI= High harvesting index

3.3 Experimental design and crop management

The experiment was laid out in 16 by 79 alpha lattice design or generalized lattices (Patterson *et al*. 1978) due to its flexibility to hold all genotypes with t=sk in two replications. The field had seventy-nine blocks per replications (s) and sixty experimental units per block (k). The spacing was 70 cm between rows and 15cm between plants with a seed rate of 5-7g per row was drilled and thinning was practiced later. Sowing was done at the onset of the main rainy season on July 12/2018 at respective testing environment. Di-ammonium phosphate (DAP) and urea were applied at the rate of 100 kg/ha and 50 kg/ha respectively as recommended for sorghum in the lowland areas of Ethiopia. DAP was applied at the time of planting, while urea application was at knee height stage (35 days after planting).

3.4 Data collected

3.4.1 Morphological traits

Five plants per genotypes were randomly taken from each plot for recording important agronomical traits. Data was measured on the following phenotypic traits (IPGR. 1993).

Plot based

1. **Date of emergency**: the date of 50% emergency of individual genotype was recording

2**. Days to 50% flowering**: Number of days from emergence to 50% flowering of plants in a plot.

3. Days to 95% maturity: Number of days from emergence to 95% of the heading in a plot had reached maturity.

4. Grain filling period = Days to 95% maturity- Days to 50% flowering.

Plant based

5. Plant height (cm): The height of the main stalk from base at soil surface to tip of the panicle measured from five randomly selected plants at physiological maturity and expressed in centimeters.

6. Leaf number: The total numbers of leaves on the main stem of five randomly selected plants were counted.

7. Number of panicles per plant: Number of fertile panicles (effective tillers) per plant from five randomly selected plants was counted.

8. Panicle length (cm): The length from the base of the panicle to the tip of the panicle was measured in centimeter of five randomly selected plants.

9. Panicle width (cm): The diameter of the panicle at its widest point measured in centimeter from five randomly selected plants.

10. Panicle weight (g): The weight of panicle from five randomly selected plants, measured in grams.

11. Grain weight (g): The average weight of cleaned grains from five randomly selected plants in a plot was weighted.

12. Panicle harvesting index (%) = $\frac{\textbf{Grain weight (cleaned)(g)}}{\textbf{Panicle weight (g)}} * 100$

13. Grain yield per plot (gp^{-1}): The average weight of grains from five randomly selected plants in a plot was weighted. The grain dried, threshed and cleaned and the moisture level adjusted to 12.5% according to Biru (1979).

Adjusted grain weight=Initial grain weight $(\frac{100-OMC}{100-DMC})$

Where: OMC = Original moisture content, DMC = Desired moisture content

14. 1000-Grain weight (g): Weight of 1000 grains in grams drawn from bulked grains of five Randomly selected plants were weighted and moisture level adjusted to 12.5%.

15. SPAD1 (chlorophyll content reading at flowering): average value of chlorophyll containt proximal, middle and distal part of a flag leave immediately after flowering from five sampled plants were recorded.

16. SPAD2 (chlorophyll content reading at maturity): average value of chlorophyll containt on proximal, middle and distal part of a flag leave at maturity from five sampled plants were recorded.

3.5 Data analysis

3.5.1 Analysis of variance (ANOVA)

The normality distribution of the data was checked using the Shapiro-Wilk W Test (Shapiro and Wilk, 1965). The analyses of variance (ANOVAs) for the alpha lattice design developed by Patterson and Williams (1976) were carried out using SAS v.9.4 (SAS, 2015).

General linear model: $yijk = \mu + ti + rj + bjk + eijk$

Where:

μ=General mean

yijk denotes the value of the observed trait for *i*-th treatment received in the *k*-th block within j-th replicate (superblock), *ti* is the fixed effect of the *i*-th treatment (*i = 1,2,…,t*); r*j* is the effect of the *j*-th replicate (superblock) (*j = 1,2,…,r*); b*jk* is the effect of the *k*-th incomplete block within the *j*-th replicate (*k = 1,2,…s*) and *eijk* is an experimental error associated with the observation of the *i*-th treatment in the *k*-th incomplete block within the *j*-th complete replicate.

Table 2. Skeleton of Analysis of variance (ANOVA) for alpha lattice (single location)

Source of variation	Degrees of freedom	Sum of squares	Mean squares	F values
Replication	r-1	SS_r	MS_r	
Block(rep)	rs-r	SS_b	MS_b	
Treatment adjusted for block	t-1	SS_t	MS_t	
Error	rt-rs-t+1	SS_e	MS_e	
Total	tr-1	SS_T		

r= replication, s=blocks in one rep or complete block t= treatment

3.5.2. Variance components

The phenotypic and genotypic variance and coefficients of variations were estimated as per the procedure suggested by Burton and De Vane (1952) as follows:

Genotypic variance (σ^2 g) =Variation of the traits due to their genetic make-up.

$$(\delta^2 g) = \frac{MSg - MSe}{r}$$

Phenotypic variance

$\delta^2 p = \delta^2 g + \delta^2 e$

Coefficient of variability (CV) = $\frac{S.D}{\ddot{x}} * 100$

Genotypic coefficients of Variation (GCV) = $\frac{\sqrt{G\delta}}{\ddot{x}}*100$

Phenotypic coefficients variation (PCV) = $\frac{\sqrt{P\delta}}{\ddot{x}}*100$ Where:

$\delta^2 p$ = Phenotypic variance, $\delta^2 g$ = Genotypic variance, MSg = mean square due to genotypes, MSe = mean square due to error, r = the number of replication, S.D = Phenotypic standard deviation, $\ddot{x}$ = population mean of the character

3.5.3. Heritability in broad sense

The heritability parameters will be computed according to Falconer (1977)

$$H^2bs = \frac{\delta^2 g}{\delta^2 p}*100$$

Where: $h^2bs\%$= Heritability percentage in broad sense.

The heritability percentage is categorized as:

Low (0-30%), moderate (30-60%) and high (≥60%) as given by Robinson *et al*. (1949)

3.5.4 Genetic advance

Genetic advance in absolute unit (GA) and percent of the mean (GAM), assuming selection of superior 5% of the genotypes was estimated in accordance with the methods illustrated by Johnson *et al*. (1955) as:

$GA = KPH^2$

$GAM = \frac{GA}{\ddot{x}} * 100$

Where

k = the standardized selection differential at 5% selection intensity (K = 2.063).

$\ddot{x}$= Grand mean of a particular F5 population

σp = phenotypic standard deviation

H^2 =heritability (Broad sense)

Genetic advance as percent of mean is categorized as Method suggested by Johnson *et al*. (1955) as follows:

Low 0-10%, moderate 10-20%, high above 20%

3.5.5 Principal component analysis (PCA)

PCA was used to determine the characters that accounted more to the total variation. A principal component based on correlation matrix was calculated using SAS software (SAS 9.4 version). General formula to compute scores on the first component extracted (created) in a principal component analysis:

C1 = b11(X1) + b12+….b1p (Xp)

Where, C1 = the subject’s score on principal component 1 (the first component extracted)

b1p = the regression coefficient (or weight) for observed variable p, as used in creating

Principal component 1 Xp = the subject’s score on observed variable.

4. RESULTS AND DISCUSSION

4 .1 Analysis of variance (ANOVA)

Analysis of variance for all quantitative traits showed highly significant difference among the genotypes (Pr< 0.001) for all traits studied (Table 3). This indicates the existence of genetic variability among the progenies evaluated which in turn shows the possibility of getting genotypes with desirable feature. It was in line with Hailes *et al.* (2016) who studied 974 sorghum landraces and reported significant differences among the accessions. Similar results were reported by Insan *et al.* (2016) for grain filling period, plant height, leaf number, panicle length, panicle weight and grain weight per panicle. Ayana and Bekele (2000) also reported similar results for 415 accessions as well as parallel result was obtained by Kalpande *et al*. (2018) for variability study in sweet sorghum.

The analysis of variance for parents showed significant ($p<0.05$) difference for most of the traits except chlorophyll content (SPAD reading) at flowering, panicle width (cm), grain weight per panicle (g) and number of panicle per plant (NPPP) shows non-significant difference among the genotypes with these traits indicating crossing or collection should performed for variability creation to improve by simple selection. Genotypes were significantly different for chlorophyll content (SPAD reading) at maturity, days to 50% flowering, grain filling period, days to 95% maturity, leaf number, plant height (cm), panicle length (cm), panicle harvesting index (%), grain yield (g), and thousand seed weight (g). This indicates the presence of considerable variation in the genetic materials (parental lines) for these traits and improvement of the parental lines with these traits is possible with simple selection.

Table 3. Analysis of variance for 14 quantitative traits of BCNAM population evaluated at Sheraro in 2018 cropping season.

S.of V.	Df	SPAD1	SPAD2	DTF	MTD	GFP	LN	PH	NPPP	PL	PWDTH	GWPP	YLD	PHI	TSY
Rep	1	5584.97**	186.23**	435.20**	482.07**	1.200^{ns}	5.12**	245.92**	0.71**	124.76**	105.01**	3568.12**	3717.51**	684.60**	221.35**
block(rep)	156	73.94**	41.74**	3.11^{ns}	3.45**	3.07^{ns}	1.09**	760.81**	0.12**	4.91**	5.93**	321.96**	329.87**	74.95**	19.79**
Progeny	1248	22.42**	61.73**	28.93**	42.10**	54.02**	0.90**	1048.11**	0.05**	9.65**	1.35**	124.82**	127.71**	69.99**	17.48**
Parent	13	26.62^{ns}	138.11**	56.44**	38.59**	58.44**	1.63*	3484.25**	0.1^{ns}	7.94*	1.73^{ns}	261.84^{ns}	168.29 **	55.32**	78.63**
Mse	1090	12.095	10.01	2.69	2.37	3.07	0.347	424.62	0.051	1.86	0.934	84.514	86.07	44.74	6.03
R-square		0.8	0.9	0.93	0.95	0.95	0.8	0.77	0.66	0.87	0.77	0.73	0.73	0.68	0.81
CV (%)		8.36	29.84	2.54	1.67	6.37	4.341	7.355	19.57	7.13	15.04	24.36	24.28	8.73	12.52

** Significant at 5% probability; ** Significant at 1% probability, ns = non-significant CV (coefficient of variation of a trait), SPAD1 (chlorophyll content at flowering), SPAD2 (chlorophyll content at maturity), Date of 50% flowering (DTF), Date of 95% physiological maturity (DTM), grain filling period (GFP), leave number(LN), plant height(PH), number of panicle per plant (NPPP), panicle length (PL), panicle width (pwdth), panicle weight per plant (PWPP), grain weight per panicle (GWPP), grain yield per panicle (YLD), panicle harvesting index (PHI), thousand seed weight (TSW)*

4.2 Mean performance of genotypes

4.2.1 Yield related traits

The progenies showed considerable variation in plant phenology (Table 2 Appendix). The grand mean for days to 50% flowering was 64.49 days and it ranged from 61.53 days to 79.03 days. Among these genotypes, the earliest flowering progenies were lines 32 (Teshale x IS14446) (61.525 days), 1226 (Teshale x IS32234) (62.9 days), 1099 (Teshale x IS16044) (64.53days), 749 Teshale x IS14298) (66.04 days) and 305 (Teshale x IS15428) (69.01 days). Whereas, lines 673 (Teshale x IS3583) (79.03 days), 903 (Teshale x IS16173) (77.68 days), 513 (Teshale x 22325) (75.2 days), 911 (Teshale x 16173) (73.73 days), and 37 (Teshale x 14446) (71.74 days) were late days of 50% flowering progenies. The check variety (Dagnew) flowered at 62.91 days which is considered as early flowering genotype and the recurrent parent (Teshale) took 62.84 days which was earlier than the check variety.

As pointed out by Tesfamichael *et al*. (2015), under drought stress conditions, delays in flowering and maturity were observed in most of the accessions when compared with the fully irrigated ones that ranged from 3 to 9 days (DF) and 1 to 12 days (DM). This indicates that drought stress affects flowering and maturity dates by retarding growth which is a strong indication of sensitivity.

Most of the genotypes showed early maturity from all families relatively compared with average mean performance of all population, recurrent parent and check that, the values for days to 95% maturity ranged from 87 to 97.5 days. The early maturing (87 days) lines were 1247 Teshale x 32234, 1219 Teshale x IS2205, 1175 Teshale x IS14556, 1137 Teshale x IS16044, 1088 Teshale x IS23988, 1035 Teshale x IS9911, 948 Teshale x IS16173, 821 Teshale x IS14298, 691 Teshale x IS3583, 567 Teshale x IS22325, 442 Teshale x IS15428, 296 Teshale x IS10876 and 154 Teshale x IS14446.

Similarity in maturity period among the genotypes may be due to the fact that they share a common recurrent parent (Teshale). Line 702 Teshale x IS14298 and 30 Teshale x IS14446 (90.5 days) took to mature. Similarly, line 1205 (Teshale x IS2205) with 13 progenies took

(91 days) from nine families and 1195 Teshale x IS2205 (92 days) with 11 progenies from seven families. These considered as medium to early date of 95% maturity relatively to other genotypes in the study. So, maturity date is the good indication for selection programs especially for drought stress that early maturing genotypes can be productive by escaping moisture stress conditions and should be selected for the target areas. The late maturing (97.5 days) lines among the thirteen families 5 Teshale x IS14446, 6 Teshale x 14446, 11 Teshale x 14446, 31 Teshale x 14446, 33 Teshale x 14446 39, Teshale x 14446, 45 Teshale x 14446, 52 Teshale x 14446, 56 Teshale x 14446, 61 Teshale x 14446, 63 Teshale x 14446, 67 Teshale x 14446, 69 Teshale x 14446, 76 Teshale x 14446, 87 Teshale x 14446 and the check varieties took 96 days to mature. This indicates that these progenies were relatively sensitive to drought stress as reported by Tesfamichael *et al*. (2015). However; according to Quinby (1974) 60-100 days is considered as early maturing and 100–120 days medium maturity types. Accordingly, all of the progenies fall under early maturing types and escape terminal stress.

In comparison with the grand mean (64.49 days), 1090 genotypes (86.23%) of the tested materials had early flowering time than the grand mean. While, 177 genotypes (14.00%) had maturity more than the grand mean. Among 1264 genotypes, progenies having less than 64.49 days of maturity can be used for development of early and medium maturing varieties for moisture stress areas.

Minimum and maximum plant heights of 174.4 cm and 350.3 cm were recorded for 134 (Teshale x 14446) and 749 (Teshale x 14298), respectively, with the grand mean of 279.57cm (Table.4). The standard check (Dagnew) was among the tallest (319.7cm).

The maximum and minimum value of chlorophyll content (SPAD reading) at flowering was 69.13 (con.) and 20.08 (con.), respectively with the average value of 41.55 (con.), while chlorophyll content (SPAD reading) at physiological maturity dropped because of leaf senescence with a mean of 10.611(con.) and ranged from 2.48 (con.) to 39.8 (con.). The check variety scored 36.86 (con.) and 12.94 (con.) for SPAD1 & SPAD2, respectively. Literature suggests that leaf senescence begins at early-onset of stress; indicating a strong relationship between SPAD readings, leaf chlorophyll content and green leaf area. Another report also showed significant correlation between stay-green rating and chlorophyll content (SPAD reading). Similar findings revealed that the QTLs detected for chlorophyll content and stay-green were overlapping (Xu *et al*., 2000a).

Borrell and Hammer (2000) reported strong association between leaf nitrogen content (LNC) at anthesis and grain yield under drought stress. They also suggested that this strong association could be used to screen genotypes for drought tolerance in sorghum breeding programs by measuring LNC at anthesis. Chapman and Barreto (1997) have shown that SPAD (chlorophyll content) can be used to estimate LNC in maize. Studies in sorghum have also shown good correlations between SPAD reading and specific leaf nitrogen (Borrell and Hammer 2000).

In addition, the chlorophyll content could be used to rate stay-green in breeding lines during the latter half of the grain-filling period (Borrell *et al*., 1999). In this investigation chlorophyll content at flowering was high contributing to green leaf area during grain filling periods. This indicates that genotypes that had high SPAD reading at grain filling and maturity exhibited high green leaf area which helps in food synthesis to facilitate grain filling, LNC and stay-green rating which shows less leaf senescence and adaptive to the drought stress (Borrell and Hammer, 2000)

4.2.1 Mean performance of yield among genotypes

For grain yield, which is the primary interest in most breeding programs; the progenies showed wide range of variability 7.82g to 67.47g per panicle with grand mean of 38.18g. The top best performed progenies were 747 Teshale x IS14298 (67.47g), 2 Teshale x IS14446 (63.87g), 107 Teshale x IS14446 (61.03g), 767 Teshale x IS14298 (58.54g) and
479 Teshale x 22325 (65.59g) (Table 2 Appendix).

Whereas 738 Teshale x 14298 (7.82g), 699 Teshale x 14298 (11.12g), 793 Teshale x 14298 (13.89g), 1083 Teshale x 23988 (16.25g) and 134 Teshale x 14446 (18.49g) were the poor performed lines in grain yield. Six hundred thirteen lines (48.961%) revealed a grain yield more than grand mean whereas 639 lines (51.04%) scored less than the grand mean. Comparing with check variety 251 (20.05%) of the progeny exceed the standard check in grain yield per panicle while 1001 progeny (79.95) less than the check variety. Kassahun, *et al*. (2015) also reported similar results in variability study on yield and yield related traits.

The variability of the genotypic mean of panicle harvesting index (%) ranged from 42.1% to 91.42% with an overall mean of 76.61%. Three hundred seventy seven (29.82%) progenies scored over the check variety while the rest progeny scored below the standard check. High value of harvest index indicating the efficiency of the varieties in converting biological yield into economic yield. Similar finding was exhibited by Malith (2015) in the experiment on assessment of drought tolerance earliness and grain yield on ICRISAT lines at South Sudan (Table 2 Appendix).

Table 4. Mean Performance of selected characters of progenies evaluated at Sheraro in 2018 cropping season

G. cod	Progenies	DTF	G. cod	Progenies	DMT	G. cod	Progenies	YLD	G. cod	Progenies	PHI	G. cod	Progenies	PH
High best performing progenies														
673	Teshalex3583	79.03	5	Teshalex14446	97.5	747	Teshalex14298	67.47	838	Teshalex16173	67.02	749	Teshalex14298	350.3
903	Teshalex16173	77.68	6	Teshalex14446	97.5	479	Teshale x22325	65.595	703	Teshalex14298	91.42	861	Teshalex16173	344.7
437	Teshalex15428	76.74	11	Teshalex14446	97.5	2	Teshalex14446	63.865	701	Teshalex14298	91.3	478	Teshale x22325	339.9
738	Teshalex14298	76.74	31	Teshalex14446	97.5	702	Teshalex14298	63.835	1242	Teshalex 32234	90.1	1197	Teshalex2205	338
755	Teshalex14298	76.74	33	Teshalex14446	97.5	914	Teshalex16173	63.615	709	Teshalex14298	89.81	859	Teshalex16173	336.2
774	Teshalex14298	76.74	39	Teshalex14446	97.5	737	Teshalex14298	63.525	781	Teshalex14298	89.55	941	Teshalex16173	332.73
972	Teshalex9911	76.73	45	Teshalex14446	97.5	668	Teshale x3583	63.43	922	Teshalex16173	89.01	40	Teshalex14446	332.6
989	Teshalex9911	76.73	52	Teshalex14446	97.5	258	Teshalex10876	62.92	1246	Teshalex 32234	88.7	947	Teshalex16173	331.9
1108	Teshale x 16044	76.73	56	Teshalex14446	97.5	579	Teshale x3583	62.53	750	Teshalex14298	88.56	559	Teshale x22325	329
830	Teshalex14298	76.73	61	Teshalex14446	97.5	996	Teshalex9911	61.195	713	Teshalex14298	88.08	867	Teshalex16173	327.6
905	Teshalex16173	76.73	63	Teshalex14446	97.5	107	Teshalex14446	61.025	862	Teshalex16173	88.02	39	Teshalex14446	326.3
947	Teshalex16173	76.73	67	Teshalex14446	97.5	1183	Teshalex2205	60.98	819	Teshalex14298	87.98	210	Teshalex10876	320.8
410	Teshalex15428	76.72	69	Teshalex14446	97.5	487	Teshale x22325	60.12	728	Teshalex14298	87.95	138	Teshalex14446	320.7
675	Teshale x3583	76.72	76	Teshalex14446	97.5	69	Teshalex14446	59.95	1196	Teshalex2205	86.26	977	Teshalex9911	320.6
684	Teshale x3583	76.72	87	Teshalex14446	97.5	138	Teshalex14446	59.465	734	Teshalex14298	86.18	871	Teshalex16173	320.1
Low value readied progenies														
406	Teshalex15428	62.835	1229	Teshalex 32234	87	1083	Teshalex23988	16.25	98	Teshalex14446	55.96	591	Teshale x3583	207.3
336	Teshalex15428	62.83	1232	Teshalex 32234	87	811	Teshalex14298	15.915	760	Teshalex14298	55.94	601	Teshale x3583	205.6
1199	Teshalex2205	62.83	1235	Teshalex 32234	87	741	Teshalex14298	15.755	358	Teshalex15428	54.87	681	Teshale x3583	202.94
348	Teshalex15428	62.825	1237	Teshalex 32234	87	631	Teshale x3583	15.12	699	Teshalex14298	54.66	806	Teshalex14298	202.9
683	Teshale x3583	62.825	1239	Teshalex 32234	87	760	Teshalex14298	14.645	968	Teshalex9911	54.25	599	Teshale x3583	197.9
726	Teshalex14298	62.825	1240	Teshalex 32234	87	793	Teshalex14298	13.885	498	Teshale x22325	53.31	631	Teshale x3583	194.5
144	Teshalex14446	62.82	1244	Teshalex 32234	87	740	Teshalex14298	13.745	182	Teshalex10876	51.64	689	Teshale x3583	194.1

256	Teshalex10876	62.815	1245	Teshalex 32234	87	699	Teshalex14298	11.12	167	Teshalex10876	50.65	676	Teshale x3583	193.5
476	Teshale x22325	62.81	1246	Teshalex 32234	87	466	Teshale x22325	9.035	741	Teshalex14298	48.67	596	Teshale x3583	187.1
32	Teshalex14446	61.525	1247	Teshalex 32234	87	738	Teshalex14298	7.82	738	Teshalex14298	42.1	134	Teshalex14446	174.4
	Min	61.525			87			7.82			42.1			174.4
	Max	79.03			97.5			67.47			107			350.3
	Mean	64.482			91.99			38.19			76.64			279.74
	LSD(1%)	1.43			3.67			2.21			1.59			3.15
	CV(%)	6.29			5.39			31.1			10.19			8.51

Min (minimum), max(maximum), mean(average value of the overall genotypic measure of a trait), CV (coefficient of variation of a trait), LSD (least significant difference between means), SPAD1 (chlorophyll content at flowering), SPAD2 (chlorophyll content at maturity), Date of 50% flowering (DTF), Date of 95% physiological maturity (DTM), grain filling period (GFP), leave number(LN), plant height(PH), number of panicle per plant (NPPP), panicle length (PL), panicle width (PWDTH), panicle weight per plant (PWPP), grain weight per panicle (gwpp), grain yield per panicle (YLD), panicle harvesting index (PHI), thousand seed weight (TSW)

In general the overall means of progenies were better than that of parental lines in most of the traits measured. For example, the minimum and maximum mean values in grain yield were 21.18g and 59.47g with the overall mean of 35.81g for parents while 7.82g and 67.47g, with an average value of 38.19g for progenies.

In the parental lines presented in (Table 5), days to 50% flowering ranged from 62.85 to 77.70 days with a mean value 67.58 days, while it ranged from 61.52 to 79.03 days with an average value of 64.48 days in progenies. Similarly, the overall mean value for days to 95% maturity was 92.41 for parental lines whereas 91.99 days was for the progenies. The mean value of panicle harvesting index was 76.64 % with a range from 42.1 % to 107 % for the progenies, while the minimum (66.59%) and maximum (87.15%) value, with the average of 76.31% for the parental lines.

This indicates that progenies had better mean performances in panicle harvest index than the parental lines which is highly correlated with grain yield. Similar results were reported by Kamatar *et al.* (2011). According to Insan *et al*. (2016), RILs F5 have higher yield than the two parents and were uniform with in line variance.

Table 5. Mean Performance of selected characters in parents evaluated at Sheraro in 2018 cropping season

parent	G.cod	YLD	Parent	G.cod	DTF	Parent	G.cod	MTD	Parent	G.cod	PH	Parent	G.cod	PHI
14446	1250	59.47	IS14556	1260	77.7	IS2205	1261	97.5	IS10876	1251	306	IS14446	1250	87.15
9911	1257	44.35	IS2205	1261	76.74	IS9911	1257	97	IS23988	1258	304.3	IS23988	1258	82.96
22325	1253	41.8	IS32234	1262	76.72	IS32234	1262	97	IS15428	1252	273.1	IS16173	1256	81.5
3583	1254	37.59	IS9911	1257	75.76	IS23988	1258	96.5	IS16044	1259	272.6	IS9911	1257	78.64
16044	1259	36.27	IS14446	1250	66.2	IS15428	1252	96	IS14446	1250	270.1	IS15428	1252	77.48
32234	1262	35.67	IS16173	1256	64.05	IS16173	1256	96	IS2205	1261	269.2	IS3583	1254	77.32
10876	1251	34.87	IS23988	1258	63.07	IS14446	1250	95.5	IS3583	1254	267.7	IS10876	1251	76.59
16173	1256	33.56	IS22325	1253	63.02	Teshale	1263	92.5	IS32234	1262	267.2	IS32234	1262	76.59
Teshale	1263	33.36	IS16044	1259	63.01	IS3583	1254	91	IS22325	1253	265.7	IS14298	1255	75.27
23988	1258	32.11	IS15428	1252	63	IS10876	1251	87	IS9911	1257	254.8	Teshale	1263	73.4
14298	1255	31.33	IS10876	1251	62.92	IS22325	1253	87	IS14556	1260	250	IS22325	1253	72.47
15428	1252	26.14	IS3583	1254	62.9	IS14298	1255	87	IS16173	1256	233.3	IS16044	1259	71.1
2205	1261	24.62	IS14298	1255	62.9	IS16044	1259	87	IS14298	1255	180.1	IS14556	1260	70.24
14556	1260	21.17	Teshale	1263	62.85	IS14556	1260	87	Teshale	1263	131.76	IS2205	1261	66.59
Min		21.18			62.85			87			131.76			66.59
Max		59.47			77.7			97.5			306			87.15
Average		35.81			67.58			92.41			248.98			76.31
LSD(5%)		9.66			1.66			4.27			32.17			4.88

Min (minimum), max(maximum), mean(average value of the overall genotypic measure of a trait), CV (coefficient of variation of a trait), LSD (least significant difference between means), SPAD1 (chlorophyll content at flowering), SPAD2 (chlorophyll content at maturity), Date of 50% flowering (DTF), Date of 95% physiological maturity (DTM), grain filling period (GFP), leave number(LN), plant height(PH), number of panicle per plant (NPPP), panicle length (PL), panicle width (PWDTH), panicle weight per plant (PWPP), grain weight per panicle (GWPP), grain yield per panicle (YLD), panicle harvesting index (PHI), thousand seed weight (TSW)

4.3 Component variance estimations

4.3.1 Genotypic coefficient of variation and phenotypic coefficient of variation

The estimates of ranges, means, phenotypic variance (σ2p) and genotypic variances (σ2g) and coefficients of variation for genotypes are presented on (Tables 6). Phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) were categorized as low (<10%), moderate (10-20%) and high (>20%) (Deshmukh *et al.,* 1986). Accordingly, high GCV values were recorded for chlorophyll content (SPAD reading) at maturity (54.396%) while traits with moderate GCV value were panicle length (10.95%), panicle width (11.55%), grain weight per panicle (16.066%), grain yield per panicle (16.291%), thousand seed weight (13.35%**)**, grain filling period (19.051%) whereas leaf number (4.529%), plant height (6.816%**)**, days to 50% flowering (5.814%**)**, days to 95% maturity (5.103%), chlorophyll content at flowering (SPAD1) (7.159%), number of panicle per plant (9.069%), panicle harvest index (4.907%) had low estimates of GCV.

High PCV was recorded for chlorophyll content (SPAD reading) at maturity (62.023%), number of panicles per plant (21.597%), grain weight per plant (28.89%) and grain yield (29.25%**)** while chlorophyll content at flowering **(**SPAD1) (11.015%), grain filling period (19.95%), panicle length (12.92%), panicle width (18.95%), thousand seed weight (18.308%) and panicle harvesting index (10.012%) revealed moderate PCV whereas leaf number (6.273%), plant height (9.189), days to 50% flowering (6.266) and days to 95% maturity (5.371) showed low PCV values. High PCV and GCV values indicate existence of genetic variability among the genotypes which allows selection for improvement.

Addisu (2011) reported similar results of genotypic and phenotypic coefficients of variation for days to 95% maturity and days to 50% flowering. Yadav (2015) reported high variation in PCV and GCV on study of F2 barley populations. Additionally, Bheemashankar (2007) also reported that characters like grain yield per plant and 1000 grain weight had high GCV and PCV in F3 sorghum progenies.

The GCV values were generally slightly smaller than their corresponding PCV values for all the traits considered, indicating the contribution of more environmental variance for the expression of phenotypic variance of the traits. This is in line with the work of Nagabhushan (2015) who reported higher percentage of PCV as compared to GCV values. However; it is contradictory to that of Legesse (2007) and Mahajan *et al*. (2011) who reported that the magnitude of PCV and GCV were more or less similar. For traits with high GCV such as chlorophyll content selection could be effective whereas for traits with moderate GCV values success of selection may not be high as later. This result is similar to the findings of Dutta *et al.* (2017) who reported lower GCV values indicating the presence of environmental influence to some degree in the phenotypic expression of the traits they studied.

4.3.2 Broad sense heritability

Heritability is a measure of the phenotypic variance attributable to genetic causes and has predictive function in plant breeding. It provides information on the extent to which a particular morphogenetic trait can be transmitted to successive generation. Broad sense heritability (H^2), is an estimate of the total contribution of the genetic variance to the total phenotypic variance of trait. Heritability values of any trait are categorized as: low (0-30%), moderate (30-60%) and high (≥60%) as given by Robinson *et al*. (1949).

Broad sense heritability (H^2) ranged from 17.63% for number of panicles per plant to 91.13% for grain filling (Table 6). High heritability values were recorded for chlorophyll content (SPAD reading) at maturity (76.917%), days to 50% flowering (86.095%), days to 95% maturity (90.291%), panicle length (71.767%) whereas as medium heritability records were revealed for SPAD1 (42.243%), leave number (52.131%), plant height (55.017%), panicle width (37.147%), grain weight per panicle (30.927%), grain yield, (31.010% thousand seed weight (53.234%). Moderate heritability indicates both environment and genetic effect on the expression of phenotype and improvement becomes takes time relatively. Characters with high heritability had less contribution of environmental factor which makes selection effective. Heritable traits are stable and pass from generation to generation.

Kenga *et al. (*2006) reported high H^2 for plant height and inflorescence length in their experiment; whereas as panicle harvest index (24.019%) and number of panicles per plant

(17.633%) had low heritability, indicating these traits were under the control of the environment and have less chance to be fixed by simple selection. Warkad (2008) reported high heritability for days to 95% maturity (90.96 %) and days to 50% flowering (90.91 %). Supportive results were reported by Deepalakshmi and Ganesamurthy (2007) for days to 50% flowering.

4.3.3 Genetic advance

Estimation of heritability value alone is less reliable as this value is prone to alter with the environmental and experimental variation (Swarup and Changale 1962). The genetic advance (GA) and genetic advance as the percentage of mean (GAM) at 5% selection intensity is presented in (Table 6). Genetic advance as percent of mean (GAM) is categorized as low (0-10%), moderate (10-20%) and high above 20% following the Method suggested by Johnson *et al.* (1955). The estimate of GA helps in understanding the type of gene action involved in expressing various polygenic characters when considered jointly with heritability. High values of GA are indicative of additive gene action whereas low values are indicative of non-additive gene action (Singh and Narayanan, 1993).

GAM values ranged from 4.95% for panicle harvest index to 98.275% for chlorophyll content (SPAD reading) at maturity. In addition to chlorophyll content (SPAD reading) at maturity, grain filling period (37.47%) and thousand seed weight (20.08%) revealed high GAM whereas moderate GAM were revealed by plant height (10.42%), date of 50% flowering (11.11%), panicle length (19.11%), panicle width (14.50%), grain weight per panicle (18.41%) and grain yield (18.69%). High GAM suggesting that these traits are highly governed by additive gene action. Hence, the improvement of these traits can be made through direct phenotypic selection (Yadav, 2015), whereas moderate GAM suggests availability of additive and non-additive gene action. High genetic advance coupled with high heritability estimates offers the most suitable condition for selection. Johnson *et al.* (1955) reported that heritability values along with estimates of genetic gain were more useful than heritability alone in predicting the effect of selection.

Traits with high broad sense heritability were days to 50% flowering (86.10%), panicle length (71.77%) coupled with moderate GAM (11.11%) and (19.11%), respectively, suggesting both additive and non-additive gene action. Supportive results were reported by Kumar *et al.* (2013) for thousand seed weight. Whereas days to 95% maturity (90.29%) coupled with low GAM (9.99%) showed non-additive gene action which may be recommended for heterosis breeding. While, chlorophyll content (SPAD reading) at flowering, leaf number, days to 95% maturity, number of panicles per plant and panicle harvest index had low GAM.

Generally moderate to high GCV, heritability and GAM association in any trait makes simple phenotypic selection effective. The results of this experiment indicates traits chlorophyll content (SPAD reading) at maturity, thousand seed weight, grain filling period, panicle length, panicle width, grain weight per panicle and grain yield per panicle were traits which can be directly improved by simple selection. However; days to 50% flowering and plant height had moderate to height H^2 and GAM. Selection for these characters would be more effective because they showed high and moderate heritability, genetic advance (as percent of mean) and GCV. The reports of Bheemashankar (2007) and Mahajan *et al.* (2011) were similar to the results of this experiment for plant height and days to 50% flowering.

High heritability values followed by high genetic advance indicated the presence of additive gene action (Kashif *et al*., 2003), and further suggests reliable crop improvement through selection of such traits. Estimates of heritability with genetic advance were more reliable and meaningful than individual consideration of the parameters (Nwangburuka *et al.,* 2012).

Table 6. Estimates of genetic variance for BCNAM population evaluated at Sheraro in 2018

traits	Range	Mean	GV	PV	GCV	PCV	H^2	GA	GAM
SPAD1	49.05	41.55±5.20	8.85	20.95	7.16	11.02	42.24	3.98	9.59
SPAD2	37.32	10.61±6.74	33.32	43.32	54.40	62.02	76.92	10.43	98.28
DTF	34.34	64.47±4.07	14.06	16.33	5.81	6.27	86.10	7.17	11.11
MTD	11.00	91.99±4.97	22.04	24.41	5.10	5.37	90.29	9.19	9.99
GFP	25.38	27.52±5.45	27.47	30.15	19.05	19.96	91.14	10.31	37.47
LN	8.87	13.57±0.88	0.38	0.73	4.53	6.27	52.13	0.91	6.74
PH	272.88	279.64±23.81	363.06	659.90	6.82	9.19	55.02	29.11	10.42
NPPP	4.00	1.15±0.26	0.01	0.06	9.07	21.60	17.63	0.09	7.85
PL	22.60	19.13±2.53	4.40	6.12	10.95	12.93	71.77	3.66	19.11
PWDTH	17.80	6.42±1.36	0.55	1.49	11.55	18.95	37.15	0.93	14.50
GWPP	82.20	37.80±11.64	36.85	119.15	16.07	28.89	30.93	6.95	18.41
YLD	86.42	38.20±11.90	38.70	124.80	16.29	29.25	31.01	7.14	18.69
TSW	129.31	76.57±7.81	6.87	12.90	13.36	18.31	53.23	3.94	20.08
PHI	35.93	19.60±3.73	14.14	58.87	4.91	10.01	24.02	3.80	4.95

SPAD1 (chlorophyll content at flowering), SPAD2 (chlorophyll content at maturity), Date of 50% flowering (DTF), Date of 95% physiological maturity (DTM), grain filling period (GFP), leave number(LN), plant height(PH), number of panicle per plant (NPPP), panicle length (PL), panicle width (PWDTH), panicle weight per plant (PWPP), grain weight per panicle (GWPP), grain yield per panicle (YLD), panicle harvesting index (PHI), thousand seed weight (TSW).

4.3.4 Principal component analysis

Principal component analysis (PCA) involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called principal components. The method consists in replacing large datasets by smaller datasets. In a first step one should highlight the associations (correlations) between variables and determine the latent (less) variables which lay behind the (more) variables measured. These hidden latent variables are called factors or components hence the name of factor analysisis (Helmy *et al.,* 2009). The main purpose is to summarize large data sets by removing any redundancy in the data. In principal component analysis the variables are treated equally, i.e. they are not divided into dependent and independent variables, as in regression analysis.

Eigenvectors can be thought as preferential direction of a data set in PCA. It can be thought as quantitative assessment of how much a component represents the data. The higher the eigenvalues of a component, the more represent the data. Those with Eigen value greater than one and component loadings greater than ±0.3 were regarded as meaningful and significant, as reported by Hair *et al*. (1998).

Therefore; from this study, only the first five PCs, which had Eigen values of 1.04 was used that explained 67.53% which was the total variation among the traits under test described in (Table 7). The first PC explained about 24.33%, the second 13.82%, third 12.32%, fourth 9.63% and the fifth explained 7.43% of the variation.

The cumulative variance upto Eigen value of 1.04 in this data shows the variance accommodated up to PC_5 contributed by an influential traits. The contribution in proportion of variance is in decreasing manner from PC1 to PC12 indicates that traits in last PCS' had low contribution in total cumulative variance and can be neglected. PC_5 at an Eigen value of (1.04) was accounted 7.43% and with total cumulative variance 67.53%.

The most important characters in PC1 (Table 7), was due to variations among the progenies mainly in grain yield per panicle (0.484), grain weight per panicle (0.483) and thousand seed weight (0.308) that totally contributing 24.33%. Thus, shows those traits play a major role in variation created under study (influential traits). According to Maletsema (2019) seed weight contributed high in PC1 in the experiment on genetic variability, heritability and genetic gain for quantitative traits in South African sorghum genotypes.

Whereas; date of 95% maturity (0.570), chlorophyll content at maturity SPAD2 (0.443), date of 50% flowering (0.384), leave number (0.324, were the variables contributed in the second PC similar results was reported by Abraha *et al*. (2015). Similarly; date of 50% flowering (0.480), date of 95% maturity (-0.332), leave number (0.362), grain filling period (-0.653) were variables influence third PC; but date of 95% maturity and grain filling period had negative loading. As well, panicle length (0.432) and panicle width (0.399) were variables control PC4 with panicle harvesting index (-0.562), thousand seed weight (-0.327) exhibited negative loading; while chlorophyll content at maturity (SPAD2) (0.367) leading variables of PC5 containing plant height (-0.651) and leave number (-0.444) shows negative loading. PC1 took the lion share in contributing to the total variance and decreasing in cumulative variance in ascending manner of PC1 to PC12.

Generally to improve these genotypes using only traits with large variance contributors per PC's are important for reducing resource expended during data collection and redundancies in large data sets.

Table 7. Principal components analysis among BCNAM population evaluated at Sheraro in 2018 cropping seasons.

Traits	PRC1	PRC2	PRC3	PRC4	PRC5
Chlorophyll content at f.	0.292	-0.141	-0.127	0.207	0.231
Chlorophyll content at m.	0.128	0.443	0.066	0.197	0.367
Date of 50% flowering	-0.124	0.384	0.480	0.085	0.247
Date of 95% maturity	0.088	0.570	-0.332	0.140	0.012
Grain filling periods	0.171	0.228	-0.653	0.063	-0.172
Leave number	0.059	0.324	0.362	0.165	-0.444
Plant height	0.232	0.064	0.143	0.189	-0.651
Number of panicle per	0.160	0.025	0.098	0.167	0.185
Panicle length	0.211	-0.252	-0.027	0.432	-0.056
Panicle width	0.271	-0.197	0.044	0.399	0.226
Grain weight per	0.483	-0.059	0.154	-0.120	0.013
Grain yield	0.484	-0.059	0.154	-0.120	0.013
Panicle harvesting index	0.286	0.030	0.030	-0.562	-0.012
Thousand seed weight	0.308	0.196	-0.016	-0.327	0.109
Eigen value	3.406	1.935	1.724	1.349	1.040
Proportion of variance (%)	24.33	13.82	12.32	9.63	7.43
Cumulative variance (%)	24.33%	38.15%	50.47%	60.1%	67.53%

5. SUMMARY AND CONCLUSION

Repeated recycling drought stress threatened food security in Ethiopia. Thus, producing sufficient food for an ever growing population is challenging. Taking in mind, the development of drought tolerant genotypes with early maturing and high yielding traits will suspected to reduce frequent crop failure. So, the aim of the current study was to evaluate BCNAM populations for drought tolerance, analyze the genetics of traits and identify genotypes with desirable drought tolerance traits with 1264 materials in alpha lattice design with two replications.

Analysis of variance for all quantitative traits showed highly significant difference among the progenies at ($Pr < 0.001$) for all traits. Indicated existence of genetic variability shows improvement can be possible. The analysis of variance for parent lines also exhibited significant difference ($p<0.05$) for most of the traits except chlorophyll content (SPAD reading) at flowering, panicle width (cm), grain weight per panicle (g) and number of panicle per plant indicating these traits were similarly performed. Thus; further improvement of this trait was prerequisite variability creation.

Earliest flowering progenies were 32 Teshale x IS14446 (61.525 days), 1226 Teshale x IS32234 (62.9 days), 1099 Teshale x IS16044 (64.53days), 749 Teshale x IS14298 (66.04 days) and 305 Teshale x IS15428 (69.01 days). While, 673 Teshale x IS3583 (79.03 days), 903 Teshale x IS16173 (77.68 days), 513 Teshale x 22325 (75.2 days), 911 Teshale x 16173 (73.73 days), and 37 Teshale x 14446 (71.74 days) were late 50% days of flowering. The check variety 1264 (Dagnew) flower at 62.91 days which considered as early flowering variety. Early flowering genotypes facilitate timely grain filling and promote early maturity.

Early days of 95% maturity of genotypes (87 days) from the thirteen families 1247 Teshale x 32234, 1219 Teshale x IS2205, 1175 Teshale x IS14556, 1137 Teshale x IS16044, 1088 Teshale x IS23988, 1035 Teshale x IS9911, 948 Teshale x IS16173, 821 Teshale x IS14298, 691 Teshale x IS3583, 567 Teshale x IS22325, 442 Teshale x IS15428, 296 Teshale x IS10876 and 154 Teshale x IS14446. Early maturing genotypes can be productive by escaping moisture stress conditions. Whereas, late maturing (97.5 days) lines among the thirteen families 5 Teshale x IS14446, 6 Teshale x 14446, 11 Teshale x 14446, 31 Teshale x 14446, 33 Teshale x 14446 39, Teshale x 14446, 45 Teshale x 14446, 52 Teshale x 14446, 56 Teshale x 14446, 61 Teshale x 14446, 63 Teshale x 14446, 67 Teshale x 14446, 69 Teshale x 14446, 76 Teshale x 14446, 87 Teshale x 14446. Additionally 1264 check varieties took (96 days) to come to mature which was relatively late 95% date of maturity.

In case of flowering parent lines Teshale (62.85) and IS14446 (66.2) were earlier flowering and 14556 (77.70) and 9911 (75.76) were late flowering parent lines. Generally the overall genotypic mean of progenies were better performed in most traits than that of parent lines in addition to grain yield with a grand mean of (35.81g g) while progenies scored (38.18g) per panicle.

High GCV values were recorded for chlorophyll content (SPAD reading) at maturity contrary, leave number, plant height, days to 50% flowering, date of 95% maturity, chlorophyll content (SPAD reading) at flowering, number of panicle per plant, Panicle harvesting index were recorded low estimates of GCV. While high PCV were recorded for chlorophyll content (SPAD reading) at maturity, number of panicle per plant**,** grain weight per plant and grain yield Whereas; leave number, plant height, date of 50% flowering, and date of 95% maturity were showed low PCV value. High PCV and GCV values were indicated existence of variability for exploiting improvement by selection. Whereas low GCV and PCV indicate low genetic variability driving improvement of these traits through selection is less effective.

High heritability values were recorded for chlorophyll content (SPAD reading) at maturity, date of 50% flowering, date of 95% maturity and panicle length shows visual phenotypic expression was the inherent material indicating less contribution of environmental factor which leads to facilitate simple selection resulting in quick progress in crop improvement. While panicle harvesting index and number of panicle per plant showed low heritability predict the phenome of these traits were under the control of the environment and less fixed by simple selection.

High GAM was recorded for chlorophyll content (SPAD reading) at maturity, grain filling period and thousand seed weight suggesting that these traits are governed by additive gene action and suited for direct selection.

Principal component analysis show PC1 was a major variance holder 24.33%, the second 13.82%, third 12.32%, fourth 9.63%, and the fifth explained 7.43% of the variation. Indicate these traits play a major role in variation created under study (influential traits).

Early flowering provide time for grain filling, early maturity progenies 1247, 1219, 1175, 1137, 1088, 1035, 948, 821, 691, 567, 442, 296, 154 are identified for moister stressed areas escaping terminal stress and can be selected for further evaluation. Thus, genotypes simultaneously identified for these traits are suspected to tolerate moisture deficit and further evaluation should applied in a target environment for future line of work.

Six hundred thirteen lines (48.961%) revealed a grain yield more than grand mean. Additionally comparing with check variety, 251 (20.05%) of the genotype exceed the standard check in grain yield per panicle. Therefore; these genotypes are promising for further evaluation in a drought stress condition

Most of Teshale x IS14446 family show good performance relatively in their earliness and grain yield as a family, progeny and parent, therefore: Line IS14446 a promising donor parent to deliver its target trait.

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7. APPENDIX

Table 1. The average monthly weather conditions at Sheraro in 2018 cropping season.

Cropping month	Sheraro			
	Temperature (OC)			Rainfall(mm)
	High	Low	Average	Precipitation
Jul	33.00	27.00	30.00	65.34
Aug	32.00	26.00	29.00	107.09
Sep	36.00	28.00	32.00	7.00
Oct	36.00	29.00	33.00	6.00
Nov	36.00	26.00	31.00	0.80
Average	34.60	27.20	31.00	37.25
Total				186.23

Table 2. Mean Performance of selected traits in BCNAM population evaluated at Sheraro in 2018

G. cod	Progenies	DTF	G. cod	Progenies	MTD	G. cod	Progenies	PH	G. cod	Progenies	YLD	G. cod	Progenies	PHI
673	Teshale x3583	79.03	5	Teshalex14446	97.5	859	Teshalex16173	286.2	747	Teshalex14298	67.47	838	Teshalex16173	67.02
903	Teshalex16173	77.69	6	Teshalex14446	97.5	749	Teshalex14298	350.3	479	Teshale x22325	65.6	703	Teshalex14298	91.42
437	Teshalex15428	76.74	11	Teshalex14446	97.5	861	Teshalex16173	344.7	2	Teshalex14446	63.87	701	Teshalex14298	91.3
738	Teshalex14298	76.74	31	Teshalex14446	97.5	478	Teshale x22325	339.9	702	Teshalex14298	63.84	1242	Teshalex 32234	90.1
755	Teshalex14298	76.74	33	Teshalex14446	97.5	1197	Teshalex2205	338	914	Teshalex16173	63.62	709	Teshalex14298	89.81
774	Teshalex14298	76.74	39	Teshalex14446	97.5	941	Teshalex16173	332.7	737	Teshalex14298	63.53	781	Teshalex14298	89.545
972	Teshalex9911	76.74	45	Teshalex14446	97.5	40	Teshalex14446	332.6	668	Teshale x3583	63.43	922	Teshalex16173	89.01
989	Teshalex9911	76.74	52	Teshalex14446	97.5	947	Teshalex16173	331.9	258	Teshalex10876	62.92	1246	Teshalex 32234	88.695
1108	Teshale x 16044	76.74	56	Teshalex14446	97.5	559	Teshale x22325	329	579	Teshale x3583	62.53	750	Teshalex14298	88.56
830	Teshalex14298	76.73	61	Teshalex14446	97.5	867	Teshalex16173	327.6	996	Teshalex9911	61.2	713	Teshalex14298	88.075
905	Teshalex16173	76.73	63	Teshalex14446	97.5	39	Teshalex14446	326.3	107	Teshalex14446	61.03	862	Teshalex16173	88.02
947	Teshalex16173	76.73	67	Teshalex14446	97.5	210	Teshalex10876	320.8	1183	Teshalex2205	60.98	819	Teshalex14298	87.98
410	Teshalex15428	76.73	69	Teshalex14446	97.5	138	Teshalex14446	320.7	487	Teshale x22325	60.12	728	Teshalex14298	87.945
675	Teshale x3583	76.73	76	Teshalex14446	97.5	977	Teshalex9911	320.6	69	Teshalex14446	59.95	1196	Teshalex2205	86.26
684	Teshale x3583	76.73	87	Teshalex14446	97.5	871	Teshalex16173	320.1	138	Teshalex14446	59.47	734	Teshalex14298	86.18
1084	Teshalex23988	76.73	94	Teshalex14446	97.5	1264	Check	319.7	817	Teshalex14298	59.2	34	Teshalex14446	86.145
91	Teshalex14446	76.72	106	Teshalex14446	97.5	853	Teshalex16173	319.1	678	Teshale x3583	59.17	87	Teshalex14446	86.03
96	Teshalex14446	76.72	109	Teshalex14446	97.5	904	Teshalex16173	319.1	801	Teshalex14298	58.94	293	Teshalex10876	85.605
1039	Teshalex23988	76.72	110	Teshalex14446	97.5	789	Teshalex14298	318.8	879	Teshalex16173	58.88	687	Teshale x3583	85.38
1105	Teshale x 16044	76.72	113	Teshalex14446	97.5	262	Teshalex10876	318.7	94	Teshalex14446	58.82	318	Teshalex15428	85.355
866	Teshalex16173	76.23	114	Teshalex14446	97.5	1243	Teshalex 32234	318.7	298	Teshalex15428	58.67	891	Teshalex16173	85.29
904	Teshalex16173	76.23	129	Teshalex14446	97.5	268	Teshalex10876	318.5	886	Teshalex16173	58.61	798	Teshalex14298	85.27
1117	Teshale x 16044	76.23	133	Teshalex14446	97.5	996	Teshalex9911	317.5	767	Teshalex14298	58.54	1063	Teshalex23988	85.245
1121	Teshale x 16044	76.23	134	Teshalex14446	97.5	52	Teshalex14446	317.4	269	Teshalex10876	58.36	753	Teshalex14298	85.22
105	Teshalex14446	76.23	137	Teshalex14446	97.5	182	Teshalex10876	317.4	146	Teshalex14446	58.32	770	Teshalex14298	85.18
5	Teshalex14446	76.22	138	Teshalex14446	97.5	498	Teshale x22325	317.4	1173	Teshalex14556	58.08	724	Teshalex14298	85.14
453	Teshale x22325	76.22	141	Teshalex14446	97.5	583	Teshale x3583	317.1	795	Teshalex14298	57.92	808	Teshalex14298	85.13
794	Teshalex14298	76.22	152	Teshalex14446	97.5	350	Teshalex15428	316.5	620	Teshale x3583	57.74	622	Teshale x3583	85.095
896	Teshalex16173	76.22	158	Teshalex10876	97.5	675	Teshale x3583	315.3	709	Teshalex14298	57.55	807	Teshalex14298	85.035

978	Teshalex9911	76.22	162	Teshalex10876	97.5	1045	Teshalex23988	314.9	562	Teshale x22325	57.43	1248	Teshalex 32234	84.995
1015	Teshalex9911	76.22	163	Teshalex10876	97.5	496	Teshale x22325	314.4	347	Teshalex15428	57.41	1074	Teshalex23988	84.945
300	Teshalex15428	76.22	170	Teshalex10876	97.5	913	Teshalex16173	314.2	404	Teshalex15428	57.18	308	Teshalex15428	84.94
358	Teshalex15428	76.22	173	Teshalex10876	97.5	1085	Teshalex23988	314	1117	Teshale x 16044	57.14	554	Teshale x22325	84.935
740	Teshalex14298	76.22	179	Teshalex10876	97.5	562	Teshale x22325	313.8	713	Teshalex14298	57.06	379	Teshalex15428	84.91
789	Teshalex14298	76.22	181	Teshalex10876	97.5	896	Teshalex16173	313.6	1226	Teshalex 32234	56.67	1071	Teshalex23988	84.905
971	Teshalex9911	76.22	182	Teshalex10876	97.5	281	Teshalex10876	313.5	1002	Teshalex9911	56.47	714	Teshalex14298	84.89
1029	Teshalex9911	76.22	186	Teshalex10876	97.5	258	Teshalex10876	313.5	67	Teshalex14446	56.01	1118	Teshale x 16044	84.85
1209	Teshalex2205	76.22	188	Teshalex10876	97.5	452	Teshale x22325	313.5	1239	Teshalex 32234	55.89	915	Teshalex16173	84.845
1236	Teshalex 32234	76.22	191	Teshalex10876	97.5	554	Teshale x22325	313.5	88	Teshalex14446	55.77	1017	Teshalex9911	84.815
134	Teshalex14446	76.21	195	Teshalex10876	97.5	1210	Teshalex2205	312.6	496	Teshale x22325	55.77	226	Teshalex10876	84.8
281	Teshalex10876	76.21	201	Teshalex10876	97.5	234	Teshalex10876	312.3	1168	Teshalex14556	55.64	990	Teshalex9911	84.76
464	Teshale x22325	76.21	208	Teshalex10876	97.5	504	Teshale x22325	312.3	141	Teshalex14446	55.62	7	Teshalex14446	84.66
765	Teshalex14298	76.21	212	Teshalex10876	97.5	1111	Teshale x 16044	312.3	690	Teshale x3583	55.56	13	Teshalex14446	84.42
773	Teshalex14298	76.21	228	Teshalex10876	97.5	502	Teshale x22325	311.9	556	Teshale x22325	55.48	523	Teshale x22325	84.41
788	Teshalex14298	76.21	231	Teshalex10876	97.5	491	Teshale x22325	311.8	87	Teshalex14446	55.45	265	Teshalex10876	84.385
831	Teshalex14298	76.21	237	Teshalex10876	97.5	276	Teshalex10876	311.4	240	Teshalex10876	54.99	638	Teshale x3583	84.38
950	Teshalex9911	76.21	258	Teshalex10876	97.5	517	Teshale x22325	310.9	891	Teshalex16173	54.88	777	Teshalex14298	84.31
952	Teshalex9911	76.21	261	Teshalex10876	97.5	906	Teshalex16173	310.8	415	Teshalex15428	54.73	487	Teshale x22325	84.27
983	Teshalex9911	76.21	272	Teshalex10876	97.5	1208	Teshalex2205	310.8	356	Teshalex15428	54.66	67	Teshalex14446	84.255
1010	Teshalex9911	76.21	280	Teshalex10876	97.5	165	Teshalex10876	310.7	195	Teshalex10876	54.5	694	Teshalex14298	84.24
1020	Teshalex9911	76.21	293	Teshalex10876	97.5	930	Teshalex16173	310.2	378	Teshalex15428	54.45	560	Teshale x22325	84.235
1083	Teshalex23988	76.21	307	Teshalex15428	97.5	215	Teshalex10876	310.1	7	Teshalex14446	54.39	761	Teshalex14298	84.225
1097	Teshale x 16044	76.21	309	Teshalex15428	97.5	534	Teshale x22325	310.1	35	Teshalex14446	54.39	641	Teshale x3583	84.18
1103	Teshale x 16044	76.21	321	Teshalex15428	97.5	912	Teshalex16173	310	139	Teshalex14446	54.31	165	Teshalex10876	84.175
1114	Teshale x 16044	76.21	329	Teshalex15428	97.5	14	Teshalex14446	309.8	257	Teshalex10876	54.25	391	Teshalex15428	84.075
1136	Teshale x 16044	76.21	336	Teshalex15428	97.5	195	Teshalex10876	309.8	1204	Teshalex2205	54.21	721	Teshalex14298	84.05
1206	Teshalex2205	76.21	339	Teshalex15428	97.5	740	Teshalex14298	309.7	1248	Teshalex 32234	54.15	79	Teshalex14446	84.03
338	Teshalex15428	76.21	341	Teshalex15428	97.5	1100	Teshale x 16044	309.7	423	Teshalex15428	54.11	620	Teshale x3583	83.995
359	Teshalex15428	76.21	345	Teshalex15428	97.5	225	Teshalex10876	309.6	649	Teshale x3583	53.47	779	Teshalex14298	83.985
380	Teshalex15428	76.21	351	Teshalex15428	97.5	553	Teshale x22325	309.5	135	Teshalex14446	53.43	1121	Teshale x 16044	83.985

389	Teshalex15428	76.21	359	Teshalex15428	97.5	1074	Teshalex23988	309.1	4	Teshalex14446	53.24	364	Teshalex15428	83.95
391	Teshalex15428	76.21	380	Teshalex15428	97.5	57	Teshalex14446	308.9	145	Teshalex14446	53.12	556	Teshale x22325	83.915
403	Teshalex15428	76.21	389	Teshalex15428	97.5	263	Teshalex10876	308.9	714	Teshalex14298	53.07	185	Teshalex10876	83.865
827	Teshalex14298	76.21	392	Teshalex15428	97.5	116	Teshalex14446	308.7	1023	Teshalex9911	52.74	16	Teshalex14446	83.84
958	Teshalex9911	76.21	394	Teshalex15428	97.5	556	Teshale x22325	308.5	800	Teshalex14298	52.62	613	Teshale x3583	83.825
1031	Teshalex9911	76.21	403	Teshalex15428	97.5	1240	Teshalex 32234	308.5	974	Teshalex9911	52.61	329	Teshalex15428	83.79
1056	Teshalex23988	76.21	405	Teshalex15428	97.5	345	Teshalex15428	308.4	1108	Teshale x 16044	52.59	834	Teshalex16173	83.785
1098	Teshale x 16044	76.21	410	Teshalex15428	97.5	430	Teshalex15428	308.1	642	Teshale x3583	52.55	831	Teshalex14298	83.72
1188	Teshalex2205	76.21	416	Teshalex15428	97.5	325	Teshalex15428	308	954	Teshalex9911	52.46	1247	Teshalex 32234	83.705
1238	Teshalex 32234	76.21	418	Teshalex15428	97.5	825	Teshalex14298	308	503	Teshale x22325	52.4	696	Teshalex14298	83.695
418	Teshalex15428	76.2	424	Teshalex15428	97.5	922	Teshalex16173	307.9	52	Teshalex14446	52.39	239	Teshalex10876	83.655
439	Teshalex15428	76.2	425	Teshalex15428	97.5	191	Teshalex10876	307.5	226	Teshalex10876	52.32	920	Teshalex16173	83.64
685	Teshale x3583	76.2	426	Teshalex15428	97.5	501	Teshale x22325	307.5	792	Teshalex14298	52.29	1163	Teshalex14556	83.635
699	Teshalex14298	76.2	430	Teshalex15428	97.5	680	Teshale x3583	307.3	71	Teshalex14446	52.27	427	Teshalex15428	83.62
801	Teshalex14298	76.2	434	Teshalex15428	97.5	1043	Teshalex23988	307.3	744	Teshalex14298	52.21	533	Teshale x22325	83.615
894	Teshalex16173	76.2	439	Teshalex15428	97.5	1226	Teshalex 32234	307.3	211	Teshalex10876	52.18	733	Teshalex14298	83.61
943	Teshalex16173	76.2	444	Teshale x22325	97.5	232	Teshalex10876	307	705	Teshalex14298	52.09	784	Teshalex14298	83.605
961	Teshalex9911	76.2	446	Teshale x22325	97.5	1079	Teshalex23988	307	734	Teshalex14298	52.06	39	Teshalex14446	83.545
999	Teshalex9911	76.2	449	Teshale x22325	97.5	193	Teshalex10876	307	111	Teshalex14446	52.04	643	Teshale x3583	83.54
1032	Teshalex9911	76.2	453	Teshale x22325	97.5	914	Teshalex16173	306.9	59	Teshalex14446	52.02	50	Teshalex14446	83.515
108	Teshalex14446	76.2	454	Teshale x22325	97.5	566	Teshale x22325	306.8	566	Teshale x22325	51.99	767	Teshalex14298	83.495
577	Teshale x3583	76.2	456	Teshale x22325	97.5	156	Teshalex10876	306.7	116	Teshalex14446	51.97	984	Teshalex9911	83.48
751	Teshalex14298	76.2	457	Teshale x22325	97.5	1061	Teshalex23988	306.7	660	Teshale x3583	51.89	1173	Teshalex14556	83.455
766	Teshalex14298	76.2	459	Teshale x22325	97.5	525	Teshale x22325	306.6	509	Teshale x22325	51.86	444	Teshale x22325	83.445
780	Teshalex14298	76.2	460	Teshale x22325	97.5	487	Teshale x22325	306.5	161	Teshalex10876	51.85	458	Teshale x22325	83.4
823	Teshalex14298	76.2	463	Teshale x22325	97.5	365	Teshalex15428	306.3	132	Teshalex14446	51.77	598	Teshale x3583	83.395
1079	Teshalex23988	76.2	465	Teshale x22325	97.5	62	Teshalex14446	306.2	610	Teshale x3583	51.76	512	Teshale x22325	83.365
1113	Teshale x 16044	76.2	466	Teshale x22325	97.5	265	Teshalex10876	306.2	243	Teshalex10876	51.73	686	Teshale x3583	83.35
103	Teshalex14446	76.19	469	Teshale x22325	97.5	1223	Teshalex 32234	306.1	985	Teshalex9911	51.72	603	Teshale x3583	83.27
272	Teshalex10876	76.19	471	Teshale x22325	97.5	107	Teshalex14446	306.1	54	Teshalex14446	51.56	882	Teshalex16173	83.265
316	Teshalex15428	76.19	473	Teshale x22325	97.5	267	Teshalex10876	305.9	916	Teshalex16173	51.52	706	Teshalex14298	83.26

736	Teshalex14298	76.19	477	Teshale x22325	97.5	1048	Teshalex23988	305.9	26	Teshalex14446	51.45	367	Teshalex15428	83.255
760	Teshalex14298	76.19	478	Teshale x22325	97.5	162	Teshalex10876	305.5	1053	Teshalex23988	51.42	668	Teshale x3583	83.215
768	Teshalex14298	76.19	484	Teshale x22325	97.5	535	Teshale x22325	305.5	1196	Teshalex2205	51.42	1002	Teshalex9911	83.19
785	Teshalex14298	76.19	488	Teshale x22325	97.5	174	Teshalex10876	305.3	1190	Teshalex2205	51.37	151	Teshalex14446	83.185
806	Teshalex14298	76.19	489	Teshale x22325	97.5	1218	Teshalex2205	305.2	488	Teshale x22325	51.26	927	Teshalex16173	83.18
1024	Teshalex9911	76.19	501	Teshale x22325	97.5	411	Teshalex15428	304.9	1064	Teshalex23988	51.2	301	Teshalex15428	83.14
1198	Teshalex2205	76.19	502	Teshale x22325	97.5	159	Teshalex10876	304.8	384	Teshalex15428	51.18	145	Teshalex14446	83.135
1070	Teshalex23988	76.19	510	Teshale x22325	97.5	915	Teshalex16173	304.8	592	Teshale x3583	51.13	419	Teshalex15428	83.12
334	Teshalex15428	76.18	526	Teshale x22325	97.5	1068	Teshalex23988	304.8	1152	Teshalex14556	51.11	305	Teshalex15428	83.1
1018	Teshalex9911	75.76	527	Teshale x22325	97.5	55	Teshalex14446	304.7	1207	Teshalex2205	51.05	36	Teshalex14446	83.06
332	Teshalex15428	75.74	529	Teshale x22325	97.5	1112	Teshale x 16044	304.5	321	Teshalex15428	51.02	742	Teshalex14298	83.04
435	Teshalex15428	75.69	535	Teshale x22325	97.5	479	Teshale x22325	304.4	743	Teshalex14298	51.01	782	Teshalex14298	82.995
530	Teshale x22325	75.23	540	Teshale x22325	97.5	916	Teshalex16173	304.4	1224	Teshalex 32234	50.95	1084	Teshalex23988	82.98
519	Teshale x22325	75.23	541	Teshale x22325	97.5	407	Teshalex15428	304.1	1159	Teshalex14556	50.88	545	Teshale x22325	82.965
61	Teshalex14446	75.22	552	Teshale x22325	97.5	1110	Teshale x 16044	304.1	1042	Teshalex23988	50.79	78	Teshalex14446	82.94
913	Teshalex16173	75.21	554	Teshale x22325	97.5	1183	Teshalex2205	304.1	39	Teshalex14446	50.7	1047	Teshalex23988	82.93
964	Teshalex9911	75.21	556	Teshale x22325	97.5	865	Teshalex16173	304	48	Teshalex14446	50.68	776	Teshalex14298	82.925
513	Teshale x22325	75.2	558	Teshale x22325	97.5	1121	Teshale x 16044	303.9	728	Teshalex14298	50.57	1060	Teshalex23988	82.91
572	Teshale x3583	75.19	568	Teshale x22325	97.5	493	Teshale x22325	303.8	966	Teshalex9911	50.57	1087	Teshalex23988	82.885
100	Teshalex14446	74.23	570	Teshale x22325	97.5	696	Teshalex14298	303.8	296	Teshalex10876	50.53	103	Teshalex14446	82.835
942	Teshalex16173	74.2	573	Teshale x3583	97.5	1066	Teshalex23988	303.8	956	Teshalex9911	50.45	423	Teshalex15428	82.835
1142	Teshalex14556	74.2	589	Teshale x3583	97.5	1191	Teshalex2205	303.8	3	Teshalex14446	50.38	26	Teshalex14446	82.825
911	Teshalex16173	73.73	592	Teshale x3583	97.5	499	Teshale x22325	303.7	889	Teshalex16173	50.37	711	Teshalex14298	82.81
16	Teshalex14446	72.72	596	Teshale x3583	97.5	540	Teshale x22325	303.7	575	Teshale x3583	50.36	428	Teshalex15428	82.795
619	Teshale x3583	72.21	598	Teshale x3583	97.5	248	Teshalex10876	303.6	807	Teshalex14298	50.36	678	Teshale x3583	82.76
37	Teshalex14446	71.74	602	Teshale x3583	97.5	465	Teshale x22325	303.3	277	Teshalex10876	50.25	928	Teshalex16173	82.755
38	Teshalex14446	71.21	603	Teshale x3583	97.5	544	Teshale x22325	303.3	235	Teshalex10876	50.24	630	Teshale x3583	82.735
47	Teshalex14446	71.21	604	Teshale x3583	97.5	886	Teshalex16173	303.3	1082	Teshalex23988	50.22	695	Teshalex14298	82.68
73	Teshalex14446	71.19	606	Teshale x3583	97.5	464	Teshale x22325	303.2	613	Teshale x3583	50.19	365	Teshalex15428	82.665
214	Teshalex10876	70.22	620	Teshale x3583	97.5	1133	Teshale x 16044	303.2	1109	Teshale x 16044	50.16	910	Teshalex16173	82.63
361	Teshalex15428	70.19	624	Teshale x3583	97.5	1238	Teshalex 32234	303.2	469	Teshale x22325	50.15	278	Teshalex10876	82.625

1048	Teshalex23988	70.07	626	Teshale x3583	97.5	463	Teshale x22325	303	147	Teshalex14446	50.13	773	Teshalex14298	82.625
314	Teshalex15428	70.06	630	Teshale x3583	97.5	283	Teshalex10876	302.9	53	Teshalex14446	50.1	247	Teshalex10876	82.615
40	Teshalex14446	70.06	631	Teshale x3583	97.5	188	Teshalex10876	302.8	365	Teshalex15428	50.04	900	Teshalex16173	82.605
975	Teshalex9911	70.05	636	Teshale x3583	97.5	521	Teshale x22325	302.8	46	Teshalex14446	49.85	671	Teshale x3583	82.595
217	Teshalex10876	70.04	643	Teshale x3583	97.5	384	Teshalex15428	302.6	30	Teshalex14446	49.83	649	Teshale x3583	82.59
107	Teshalex14446	70.02	645	Teshale x3583	97.5	298	Teshalex15428	302.5	411	Teshalex15428	49.81	174	Teshalex10876	82.57
635	Teshale x3583	69.6	648	Teshale x3583	97.5	242	Teshalex10876	302.4	174	Teshalex10876	49.8	60	Teshalex14446	82.565
518	Teshale x22325	69.57	654	Teshale x3583	97.5	1236	Teshalex 32234	302.4	881	Teshalex16173	49.77	116	Teshalex14446	82.565
819	Teshalex14298	69.56	660	Teshale x3583	97.5	879	Teshalex16173	302.2	781	Teshalex14298	49.74	49	Teshalex14446	82.535
650	Teshale x3583	69.07	663	Teshale x3583	97.5	1039	Teshalex23988	301.9	205	Teshalex10876	49.7	717	Teshalex14298	82.53
1163	Teshalex14556	69.07	665	Teshale x3583	97.5	295	Teshalex10876	301.6	372	Teshalex15428	49.7	1092	Teshale x 16044	82.515
123	Teshalex14446	69.06	667	Teshale x3583	97.5	170	Teshalex10876	301.5	1218	Teshalex2205	49.7	236	Teshalex10876	82.485
893	Teshalex16173	69.06	675	Teshale x3583	97.5	451	Teshale x22325	301.5	782	Teshalex14298	49.66	225	Teshalex10876	82.475
313	Teshalex15428	69.04	692	Teshale x3583	97.5	807	Teshalex14298	301.5	492	Teshale x22325	49.65	194	Teshalex10876	82.47
62	Teshalex14446	69.03	693	Teshale x3583	97.5	395	Teshalex15428	301.4	1132	Teshale x 16044	49.62	469	Teshale x22325	82.45
262	Teshalex10876	69.02	705	Teshalex14298	97.5	538	Teshale x22325	301.4	540	Teshale x22325	49.56	1159	Teshalex14556	82.445
1019	Teshalex9911	69.02	708	Teshalex14298	97.5	929	Teshalex16173	301.3	99	Teshalex14446	49.51	1249	Teshalex 32234	82.385
628	Teshale x3583	69.01	717	Teshalex14298	97.5	1136	Teshale x 16044	301.3	637	Teshale x3583	49.51	758	Teshalex14298	82.38
305	Teshalex15428	69.01	721	Teshalex14298	97.5	338	Teshalex15428	301.2	1100	Teshale x 16044	49.38	205	Teshalex10876	82.365
616	Teshale x3583	67.7	724	Teshalex14298	97.5	987	Teshalex9911	301.2	665	Teshale x3583	49.32	131	Teshalex14446	82.3
180	Teshalex10876	66.67	728	Teshalex14298	97.5	1222	Teshalex 32234	301.2	680	Teshale x3583	49.3	756	Teshalex14298	82.285
930	Teshalex16173	66.59	731	Teshalex14298	97.5	454	Teshale x22325	301.1	9	Teshalex14446	49.3	249	Teshalex10876	82.27
133	Teshalex14446	66.21	738	Teshalex14298	97.5	940	Teshalex16173	301.1	1043	Teshalex23988	49.27	795	Teshalex14298	82.27
373	Teshalex15428	66.19	745	Teshalex14298	97.5	277	Teshalex10876	301	1136	Teshale x 16044	49.24	1134	Teshale x 16044	82.24
367	Teshalex15428	66.18	746	Teshalex14298	97.5	236	Teshalex10876	300.8	657	Teshale x3583	49.12	659	Teshale x3583	82.235
718	Teshalex14298	66.08	757	Teshalex14298	97.5	394	Teshalex15428	300.8	810	Teshalex14298	48.97	800	Teshalex14298	82.235
749	Teshalex14298	66.04	771	Teshalex14298	97.5	486	Teshale x22325	300.5	199	Teshalex10876	48.96	368	Teshalex15428	82.22
320	Teshalex15428	65.67	774	Teshalex14298	97.5	575	Teshale x3583	300.5	756	Teshalex14298	48.87	146	Teshalex14446	82.215
451	Teshale x22325	65.21	778	Teshalex14298	97.5	303	Teshalex15428	300.4	104	Teshalex14446	48.85	720	Teshalex14298	82.21
614	Teshale x3583	65.21	779	Teshalex14298	97.5	579	Teshale x3583	300.4	459	Teshale x22325	48.85	296	Teshalex10876	82.2
1022	Teshalex9911	65.2	780	Teshalex14298	97.5	1058	Teshalex23988	300.4	130	Teshalex14446	48.82	504	Teshale x22325	82.19

977	Teshalex9911	65.2	782	Teshalex14298	97.5	1220	Teshalex 32234	300.4	55	Teshalex14446	48.8	152	Teshalex14446	82.165
1107	Teshale x 16044	65.19	783	Teshalex14298	97.5	1225	Teshalex 32234	300.4	1025	Teshalex9911	48.74	1078	Teshalex23988	82.145
1112	Teshale x 16044	65.19	787	Teshalex14298	97.5	954	Teshalex9911	300.3	929	Teshalex16173	48.69	810	Teshalex14298	82.135
918	Teshalex16173	65.18	799	Teshalex14298	97.5	1239	Teshalex 32234	300.2	622	Teshale x3583	48.69	549	Teshale x22325	82.13
962	Teshalex9911	65.17	803	Teshalex14298	97.5	3	Teshalex14446	300.1	250	Teshalex10876	48.64	384	Teshalex15428	82.1
1195	Teshalex2205	65.16	814	Teshalex14298	97.5	280	Teshalex10876	300.1	293	Teshalex10876	48.54	1100	Teshale x 16044	82.09
1050	Teshalex23988	65.09	816	Teshalex14298	97.5	477	Teshale x22325	300	1246	Teshalex 32234	48.5	747	Teshalex14298	82.08
857	Teshalex16173	65.06	818	Teshalex14298	97.5	714	Teshalex14298	300	40	Teshalex14446	48.49	801	Teshalex14298	82.035
1028	Teshalex9911	65.05	820	Teshalex14298	97.5	1118	Teshale x 16044	300	635	Teshale x3583	48.47	345	Teshalex15428	82.03
1216	Teshalex2205	65.02	827	Teshalex14298	97.5	984	Teshalex9911	299.9	1018	Teshalex9911	48.43	914	Teshalex16173	82.025
1092	Teshale x 16044	65.02	829	Teshalex14298	97.5	543	Teshale x22325	299.8	454	Teshale x22325	48.41	818	Teshalex14298	82.01
1200	Teshalex2205	65.01	834	Teshalex16173	97.5	891	Teshalex16173	299.6	1150	Teshalex14556	48.4	343	Teshalex15428	82
455	Teshale x22325	64.59	848	Teshalex16173	97.5	272	Teshalex10876	299.5	391	Teshalex15428	48.3	254	Teshalex10876	81.995
829	Teshalex14298	64.59	854	Teshalex16173	97.5	335	Teshalex15428	299.5	930	Teshalex16173	48.27	161	Teshalex10876	81.985
1186	Teshalex2205	64.58	857	Teshalex16173	97.5	665	Teshale x3583	299.5	861	Teshalex16173	48.25	417	Teshalex15428	81.975
392	Teshalex15428	64.58	866	Teshalex16173	97.5	278	Teshalex10876	299.4	1081	Teshalex23988	48.24	1111	Teshale x 16044	81.95
669	Teshale x3583	64.57	869	Teshalex16173	97.5	432	Teshalex15428	299.4	945	Teshalex16173	48.17	994	Teshalex9911	81.935
799	Teshalex14298	64.57	876	Teshalex16173	97.5	719	Teshalex14298	299.4	1093	Teshale x 16044	48.02	86	Teshalex14446	81.925
1205	Teshalex2205	64.56	889	Teshalex16173	97.5	945	Teshalex16173	299.4	72	Teshalex14446	48.01	632	Teshale x3583	81.905
966	Teshalex9911	64.54	896	Teshalex16173	97.5	1187	Teshalex2205	299.4	185	Teshalex10876	48	83	Teshalex14446	81.9
543	Teshale x22325	64.54	898	Teshalex16173	97.5	1053	Teshalex23988	299.3	1	Teshalex14446	48	1033	Teshalex9911	81.865
1120	Teshale x 16044	64.54	904	Teshalex16173	97.5	289	Teshalex10876	299.1	270	Teshalex10876	47.97	166	Teshalex10876	81.86
279	Teshalex10876	64.53	905	Teshalex16173	97.5	169	Teshalex10876	299	882	Teshalex16173	47.93	974	Teshalex9911	81.825
342	Teshalex15428	64.53	911	Teshalex16173	97.5	733	Teshalex14298	299	1107	Teshale x 16044	47.88	1129	Teshale x 16044	81.825
1099	Teshale x 16044	64.53	923	Teshalex16173	97.5	878	Teshalex16173	299	267	Teshalex10876	47.87	30	Teshalex14446	81.82
864	Teshalex16173	64.21	925	Teshalex16173	97.5	358	Teshalex15428	298.8	976	Teshalex9911	47.83	732	Teshalex14298	81.815
835	Teshalex16173	64.2	928	Teshalex16173	97.5	415	Teshalex15428	298.8	32	Teshalex14446	47.78	121	Teshalex14446	81.785
855	Teshalex16173	64.2	929	Teshalex16173	97.5	507	Teshale x22325	298.7	813	Teshalex14298	47.78	354	Teshalex15428	81.78
611	Teshale x3583	64.18	930	Teshalex16173	97.5	909	Teshalex16173	298.7	1217	Teshalex2205	47.67	526	Teshale x22325	81.78
997	Teshalex9911	64.09	937	Teshalex16173	97.5	894	Teshalex16173	298.6	1027	Teshalex9911	47.66	757	Teshalex14298	81.755
30	Teshalex14446	64.08	941	Teshalex16173	97.5	1093	Teshale x 16044	298.6	169	Teshalex10876	47.58	37	Teshalex14446	81.745

160	Teshalex10876	64.08	945	Teshalex16173	97.5	320	Teshalex15428	298.5	784	Teshalex14298	47.47	143	Teshalex14446	81.745
372	Teshalex15428	64.08	947	Teshalex16173	97.5	817	Teshalex14298	298.5	37	Teshalex14446	47.44	201	Teshalex10876	81.745
1191	Teshalex2205	64.08	950	Teshalex9911	97.5	974	Teshalex9911	298.5	15	Teshalex14446	47.36	551	Teshale x22325	81.73
165	Teshalex10876	64.07	951	Teshalex9911	97.5	1028	Teshalex9911	298.5	952	Teshalex9911	47.36	527	Teshale x22325	81.715
310	Teshalex15428	64.07	952	Teshalex9911	97.5	1129	Teshale x 16044	298.5	1003	Teshalex9911	47.36	1107	Teshale x 16044	81.685
995	Teshalex9911	64.07	953	Teshalex9911	97.5	148	Teshalex14446	298.4	877	Teshalex16173	47.34	725	Teshalex14298	81.675
1012	Teshalex9911	64.07	955	Teshalex9911	97.5	33	Teshalex14446	298.3	68	Teshalex14446	47.3	624	Teshale x3583	81.665
341	Teshalex15428	64.07	956	Teshalex9911	97.5	361	Teshalex15428	298.3	615	Teshale x3583	47.29	651	Teshale x3583	81.665
805	Teshalex14298	64.07	958	Teshalex9911	97.5	245	Teshalex10876	298.2	919	Teshalex16173	47.25	211	Teshalex10876	81.66
853	Teshalex16173	64.07	965	Teshalex9911	97.5	1017	Teshalex9911	298.1	210	Teshalex10876	47.14	870	Teshalex16173	81.66
1100	Teshale x 16044	64.07	966	Teshalex9911	97.5	27	Teshalex14446	298.1	297	Teshalex10876	47.08	518	Teshale x22325	81.65
1145	Teshalex14556	64.07	970	Teshalex9911	97.5	1082	Teshalex23988	298	387	Teshalex15428	47.07	546	Teshale x22325	81.63
443	Teshale x22325	64.06	978	Teshalex9911	97.5	294	Teshalex10876	297.9	33	Teshalex14446	46.95	240	Teshalex10876	81.625
111	Teshalex14446	64.06	979	Teshalex9911	97.5	826	Teshalex14298	297.9	343	Teshalex15428	46.9	451	Teshale x22325	81.62
414	Teshalex15428	64.06	983	Teshalex9911	97.5	132	Teshalex14446	297.8	796	Teshalex14298	46.88	489	Teshale x22325	81.62
421	Teshalex15428	64.06	984	Teshalex9911	97.5	381	Teshalex15428	297.8	977	Teshalex9911	46.88	99	Teshalex14446	81.615
933	Teshalex16173	64.06	989	Teshalex9911	97.5	492	Teshale x22325	297.8	86	Teshalex14446	46.86	588	Teshale x3583	81.59
954	Teshalex9911	64.06	992	Teshalex9911	97.5	713	Teshalex14298	297.8	1032	Teshalex9911	46.85	719	Teshalex14298	81.545
697	Teshalex14298	64.05	1000	Teshalex9911	97.5	147	Teshalex14446	297.7	350	Teshalex15428	46.78	356	Teshalex15428	81.54
745	Teshalex14298	64.05	1020	Teshalex9911	97.5	403	Teshalex15428	297.7	549	Teshale x22325	46.78	1025	Teshalex9911	81.54
1090	Teshalex23988	64.05	1027	Teshalex9911	97.5	480	Teshale x22325	297.7	978	Teshalex9911	46.78	1136	Teshale x 16044	81.53
1214	Teshalex2205	64.05	1028	Teshalex9911	97.5	697	Teshalex14298	297.6	853	Teshalex16173	46.76	975	Teshalex9911	81.51
702	Teshalex14298	64.05	1030	Teshalex9911	97.5	1176	Teshalex14556	297.6	786	Teshalex14298	46.67	401	Teshalex15428	81.5
1247	Teshalex 32234	64.05	1033	Teshalex9911	97.5	1105	Teshale x 16044	297.5	725	Teshalex14298	46.65	1226	Teshalex 32234	81.495
128	Teshalex14446	64.04	1039	Teshalex23988	97.5	351	Teshalex15428	297.3	982	Teshalex9911	46.65	149	Teshalex14446	81.48
363	Teshalex15428	64.04	1040	Teshalex23988	97.5	532	Teshale x22325	297.3	14	Teshalex14446	46.63	1113	Teshale x 16044	81.475
742	Teshalex14298	64.04	1048	Teshalex23988	97.5	840	Teshalex16173	297.3	961	Teshalex9911	46.59	158	Teshalex10876	81.46
976	Teshalex9911	64.04	1053	Teshalex23988	97.5	959	Teshalex9911	297.3	244	Teshalex10876	46.58	949	Teshalex16173	81.44
1021	Teshalex9911	64.04	1054	Teshalex23988	97.5	181	Teshalex10876	297.2	1086	Teshalex23988	46.55	8	Teshalex14446	81.43
1059	Teshalex23988	64.04	1056	Teshalex23988	97.5	805	Teshalex14298	297.2	1153	Teshalex14556	46.53	1221	Teshalex 32234	81.43
426	Teshalex15428	64.04	1062	Teshalex23988	97.5	830	Teshalex14298	297.1	1087	Teshalex23988	46.46	252	Teshalex10876	81.42

695	Teshalex14298	64.03	1073	Teshalex23988	97.5	417	Teshalex15428	297	701	Teshalex14298	46.43	488	Teshale x22325	81.42
803	Teshalex14298	64.03	1078	Teshalex23988	97.5	514	Teshale x22325	297	948	Teshalex16173	46.43	88	Teshalex14446	81.4
860	Teshalex16173	64.03	1089	Teshalex23988	97.5	218	Teshalex10876	296.9	658	Teshale x3583	46.42	681	Teshale x3583	81.4
329	Teshalex15428	64.03	1090	Teshalex23988	97.5	550	Teshale x22325	296.9	719	Teshalex14298	46.3	297	Teshalex10876	81.395
838	Teshalex16173	64.03	1091	Teshalex23988	97.5	457	Teshale x22325	296.8	873	Teshalex16173	46.3	237	Teshalex10876	81.375
1065	Teshalex23988	64.03	1097	Teshale x 16044	97.5	942	Teshalex16173	296.8	896	Teshalex16173	46.29	77	Teshalex14446	81.345
1067	Teshalex23988	64.03	1110	Teshale x 16044	97.5	250	Teshalex10876	296.7	43	Teshalex14446	46.25	15	Teshalex14446	81.32
360	Teshalex15428	64.02	1115	Teshale x 16044	97.5	838	Teshalex16173	296.7	700	Teshalex14298	46.25	112	Teshalex14446	81.32
1249	Teshalex 32234	64.02	1117	Teshale x 16044	97.5	257	Teshalex10876	296.6	703	Teshalex14298	46.17	55	Teshalex14446	81.3
858	Teshalex16173	64.01	1129	Teshale x 16044	97.5	330	Teshalex15428	296.6	1009	Teshalex9911	46.16	32	Teshalex14446	81.29
1044	Teshalex23988	64.01	1133	Teshale x 16044	97.5	374	Teshalex15428	296.6	483	Teshale x22325	46.14	1207	Teshalex2205	81.29
1192	Teshalex2205	64.01	1138	Teshalex14556	97.5	472	Teshale x22325	296.6	188	Teshalex10876	46.03	1213	Teshalex2205	81.29
1197	Teshalex2205	64.01	1139	Teshalex14556	97.5	720	Teshalex14298	296.5	724	Teshalex14298	46.01	94	Teshalex14446	81.265
1203	Teshalex2205	64.01	1145	Teshalex14556	97.5	311	Teshalex15428	296.4	913	Teshalex16173	45.99	216	Teshalex10876	81.255
880	Teshalex16173	64.01	1156	Teshalex14556	97.5	801	Teshalex14298	296.3	803	Teshalex14298	45.95	40	Teshalex14446	81.25
233	Teshalex10876	63.71	1158	Teshalex14556	97.5	149	Teshalex14446	296.2	1140	Teshalex14556	45.86	132	Teshalex14446	81.24
539	Teshale x22325	63.71	1167	Teshalex14556	97.5	347	Teshalex15428	296.2	300	Teshalex15428	45.85	501	Teshale x22325	81.235
176	Teshalex10876	63.71	1172	Teshalex14556	97.5	444	Teshale x22325	296.2	574	Teshale x3583	45.81	1239	Teshalex 32234	81.225
440	Teshalex15428	63.71	1176	Teshalex14556	97.5	777	Teshalex14298	296.2	486	Teshale x22325	45.79	690	Teshale x3583	81.22
1180	Teshalex2205	63.71	1178	Teshalex2205	97.5	979	Teshalex9911	296.1	18	Teshalex14446	45.79	966	Teshalex9911	81.22
868	Teshalex16173	63.7	1179	Teshalex2205	97.5	458	Teshale x22325	296	946	Teshalex16173	45.75	1082	Teshalex23988	81.215
398	Teshalex15428	63.7	1180	Teshalex2205	97.5	273	Teshalex10876	295.9	434	Teshalex15428	45.75	744	Teshalex14298	81.195
324	Teshalex15428	63.69	1182	Teshalex2205	97.5	1116	Teshale x 16044	295.9	1264	Check	45.74	1162	Teshalex14556	81.16
612	Teshale x3583	63.69	1189	Teshalex2205	97.5	690	Teshale x3583	295.8	523	Teshale x22325	45.73	849	Teshalex16173	81.145
910	Teshalex16173	63.69	1193	Teshalex2205	97.5	536	Teshale x22325	295.7	818	Teshalex14298	45.72	796	Teshalex14298	81.14
676	Teshale x3583	63.69	1194	Teshalex2205	97.5	687	Teshale x3583	295.7	975	Teshalex9911	45.64	1	Teshalex14446	81.13
1148	Teshalex14556	63.69	1196	Teshalex2205	97.5	769	Teshalex14298	295.7	979	Teshalex9911	45.56	567	Teshale x22325	81.125
432	Teshalex15428	63.68	1202	Teshalex2205	97.5	251	Teshalex10876	295.5	364	Teshalex15428	45.54	189	Teshalex10876	81.115
290	Teshalex10876	63.67	1207	Teshalex2205	97.5	1103	Teshale x 16044	295.5	955	Teshalex9911	45.52	331	Teshalex15428	81.09
1174	Teshalex14556	63.67	1208	Teshalex2205	97.5	636	Teshale x3583	295.4	512	Teshale x22325	45.52	198	Teshalex10876	81.085
260	Teshalex10876	63.66	1210	Teshalex2205	97.5	1078	Teshalex23988	295.4	8	Teshalex14446	45.5	865	Teshalex16173	81.07

793	Teshalex14298	63.58	1222	Teshalex 32234	97.5	1242	Teshalex 32234	295.4	189	Teshalex10876	45.49	536	Teshale x22325	81.065
586	Teshale x3583	63.57	1224	Teshalex 32234	97.5	960	Teshalex9911	295.4	273	Teshalex10876	45.47	2	Teshalex14446	81.045
767	Teshalex14298	63.57	1231	Teshalex 32234	97.5	702	Teshalex14298	295.3	481	Teshale x22325	45.44	535	Teshale x22325	81.03
162	Teshalex10876	63.56	1236	Teshalex 32234	97.5	561	Teshale x22325	295.3	928	Teshalex16173	45.44	72	Teshalex14446	81.02
710	Teshalex14298	63.56	1241	Teshalex 32234	97.5	202	Teshalex10876	295.3	525	Teshale x22325	45.39	195	Teshalex10876	80.995
303	Teshalex15428	63.56	1242	Teshalex 32234	97.5	397	Teshalex15428	295.3	1176	Teshalex14556	45.36	610	Teshale x3583	80.985
654	Teshale x3583	63.55	1243	Teshalex 32234	97.5	482	Teshale x22325	295.3	299	Teshalex15428	45.35	253	Teshalex10876	80.945
843	Teshalex16173	63.55	7	Teshalex14446	97	524	Teshale x22325	295.3	962	Teshalex9911	45.32	1122	Teshale x 16044	80.935
395	Teshalex15428	63.53	96	Teshalex14446	97	668	Teshale x3583	295.3	925	Teshalex16173	45.26	553	Teshale x22325	80.92
956	Teshalex9911	63.48	144	Teshalex14446	97	753	Teshalex14298	295.3	121	Teshalex14446	45.22	1009	Teshalex9911	80.915
193	Teshalex10876	63.46	180	Teshalex10876	97	184	Teshalex10876	295.2	165	Teshalex10876	45.22	1169	Teshalex14556	80.91
909	Teshalex16173	63.46	196	Teshalex10876	97	49	Teshalex14446	295.2	885	Teshalex16173	45.2	579	Teshale x3583	80.905
7	Teshalex14446	63.42	219	Teshalex10876	97	87	Teshalex14446	295.2	207	Teshalex10876	45.15	1104	Teshale x 16044	80.905
576	Teshale x3583	63.2	233	Teshalex10876	97	443	Teshale x22325	295.2	834	Teshalex16173	45.15	1183	Teshalex2205	80.895
97	Teshalex14446	63.19	236	Teshalex10876	97	620	Teshale x3583	295.2	1185	Teshalex2205	45.15	774	Teshalex14298	80.885
51	Teshalex14446	63.19	282	Teshalex10876	97	923	Teshalex16173	295.2	123	Teshalex14446	45.14	3	Teshalex14446	80.865
101	Teshalex14446	63.09	301	Teshalex15428	97	541	Teshale x22325	294.9	1017	Teshalex9911	45.14	730	Teshalex14298	80.865
154	Teshalex14446	63.09	376	Teshalex15428	97	1228	Teshalex 32234	294.8	757	Teshalex14298	45.13	700	Teshalex14298	80.855
925	Teshalex16173	63.09	396	Teshalex15428	97	555	Teshale x22325	294.7	1133	Teshale x 16044	45.11	29	Teshalex14446	80.85
339	Teshalex15428	63.08	436	Teshalex15428	97	796	Teshalex14298	294.7	924	Teshalex16173	45.1	434	Teshalex15428	80.84
396	Teshalex15428	63.08	451	Teshale x22325	97	1120	Teshale x 16044	294.7	158	Teshalex10876	45.08	921	Teshalex16173	80.84
874	Teshalex16173	63.08	458	Teshale x22325	97	683	Teshale x3583	294.6	227	Teshalex10876	45.06	298	Teshalex15428	80.81
916	Teshalex16173	63.08	470	Teshale x22325	97	71	Teshalex14446	294.5	951	Teshalex9911	45.05	105	Teshalex14446	80.795
1177	Teshalex2205	63.08	480	Teshale x22325	97	747	Teshalex14298	294.5	430	Teshalex15428	44.98	109	Teshalex14446	80.79
14	Teshalex14446	63.07	504	Teshale x22325	97	510	Teshale x22325	294.4	855	Teshalex16173	44.93	811	Teshalex14298	80.755
343	Teshalex15428	63.07	507	Teshale x22325	97	563	Teshale x22325	294.4	588	Teshale x3583	44.91	372	Teshalex15428	80.74
345	Teshalex15428	63.07	542	Teshale x22325	97	226	Teshalex10876	294.3	730	Teshalex14298	44.83	348	Teshalex15428	80.73
370	Teshalex15428	63.07	547	Teshale x22325	97	1081	Teshalex23988	294.3	963	Teshalex9911	44.8	385	Teshalex15428	80.725
433	Teshalex15428	63.07	553	Teshale x22325	97	1107	Teshale x 16044	294.3	56	Teshalex14446	44.79	1102	Teshale x 16044	80.72
644	Teshale x3583	63.07	577	Teshale x3583	97	1190	Teshalex2205	294.3	333	Teshalex15428	44.78	269	Teshalex10876	80.71
665	Teshale x3583	63.07	619	Teshale x3583	97	619	Teshale x3583	294.2	64	Teshalex14446	44.73	996	Teshalex9911	80.71

682	Teshale x3583	63.07	644	Teshale x3583	97	852	Teshalex16173	294.2	1028	Teshalex9911	44.72	235	Teshalex10876	80.705
783	Teshalex14298	63.07	662	Teshale x3583	97	931	Teshalex16173	294.2	735	Teshalex14298	44.71	1140	Teshalex14556	80.7
982	Teshalex9911	63.07	707	Teshalex14298	97	1062	Teshalex23988	294.2	236	Teshalex10876	44.71	1150	Teshalex14556	80.7
1038	Teshalex23988	63.07	725	Teshalex14298	97	1207	Teshalex2205	294.2	125	Teshalex14446	44.68	245	Teshalex10876	80.695
1071	Teshalex23988	63.07	755	Teshalex14298	97	199	Teshalex10876	294.1	63	Teshalex14446	44.68	395	Teshalex15428	80.695
22	Teshalex14446	63.07	759	Teshalex14298	97	1117	Teshale x 16044	294.1	1123	Teshale x 16044	44.67	1012	Teshalex9911	80.69
75	Teshalex14446	63.07	823	Teshalex14298	97	469	Teshale x22325	294	394	Teshalex15428	44.67	648	Teshale x3583	80.66
294	Teshalex10876	63.07	844	Teshalex16173	97	732	Teshalex14298	294	733	Teshalex14298	44.61	52	Teshalex14446	80.65
296	Teshalex10876	63.07	868	Teshalex16173	97	786	Teshalex14298	293.9	959	Teshalex9911	44.58	300	Teshalex15428	80.645
307	Teshalex15428	63.07	881	Teshalex16173	97	899	Teshalex16173	293.9	624	Teshale x3583	44.55	985	Teshalex9911	80.645
351	Teshalex15428	63.07	890	Teshalex16173	97	370	Teshalex15428	293.8	331	Teshalex15428	44.5	1200	Teshalex2205	80.64
416	Teshalex15428	63.07	908	Teshalex16173	97	1010	Teshalex9911	293.8	334	Teshalex15428	44.48	839	Teshalex16173	80.615
445	Teshale x22325	63.07	932	Teshalex16173	97	1051	Teshalex23988	293.8	76	Teshalex14446	44.44	973	Teshalex9911	80.615
466	Teshale x22325	63.07	972	Teshalex9911	97	270	Teshalex10876	293.7	301	Teshalex15428	44.42	394	Teshalex15428	80.575
504	Teshale x22325	63.07	1092	Teshale x 16044	97	420	Teshalex15428	293.7	875	Teshalex16173	44.41	543	Teshale x22325	80.56
533	Teshale x22325	63.07	1099	Teshale x 16044	97	1047	Teshalex23988	293.7	552	Teshale x22325	44.38	111	Teshalex14446	80.55
556	Teshale x22325	63.07	1105	Teshale x 16044	97	448	Teshale x22325	293.6	143	Teshalex14446	44.35	295	Teshalex10876	80.525
593	Teshale x3583	63.07	1107	Teshale x 16044	97	503	Teshale x22325	293.6	999	Teshalex9911	44.34	661	Teshale x3583	80.505
597	Teshale x3583	63.07	1120	Teshale x 16044	97	727	Teshalex14298	293.6	1092	Teshale x 16044	44.3	1010	Teshalex9911	80.505
899	Teshalex16173	63.07	1155	Teshalex14556	97	814	Teshalex14298	293.5	661	Teshale x3583	44.25	294	Teshalex10876	80.5
1167	Teshalex14556	63.07	1177	Teshalex2205	97	824	Teshalex14298	293.5	527	Teshale x22325	44.22	582	Teshale x3583	80.5
1194	Teshalex2205	63.07	1230	Teshalex 32234	97	870	Teshalex16173	293.5	697	Teshalex14298	44.19	657	Teshale x3583	80.485
550	Teshale x22325	62.99	423	Teshalex15428	87	962	Teshalex9911	271.2	1120	Teshale x 16044	32.51	612	Teshale x3583	74.32
575	Teshale x3583	62.99	427	Teshalex15428	87	671	Teshale x3583	271.1	994	Teshalex9911	32.5	426	Teshalex15428	74.315
741	Teshalex14298	62.99	428	Teshalex15428	87	958	Teshalex9911	271.1	345	Teshalex15428	32.49	490	Teshale x22325	74.315
840	Teshalex16173	62.99	432	Teshalex15428	87	837	Teshalex16173	271	723	Teshalex14298	32.47	670	Teshale x3583	74.31
851	Teshalex16173	62.99	433	Teshalex15428	87	884	Teshalex16173	271	776	Teshalex14298	32.46	214	Teshalex10876	74.305
856	Teshalex16173	62.99	435	Teshalex15428	87	402	Teshalex15428	270.9	1063	Teshalex23988	32.46	184	Teshalex10876	74.285
859	Teshalex16173	62.99	438	Teshalex15428	87	692	Teshale x3583	270.9	902	Teshalex16173	32.45	1070	Teshalex23988	74.245
981	Teshalex9911	62.99	441	Teshalex15428	87	956	Teshalex9911	270.8	114	Teshalex14446	32.4	1028	Teshalex9911	74.205
13	Teshalex14446	62.98	442	Teshalex15428	87	416	Teshalex15428	270.7	529	Teshale x22325	32.4	558	Teshale x22325	74.165

66	Teshalex14446	62.98	445	Teshale x22325	87	653	Teshale x3583	270.7	516	Teshale x22325	32.37	310	Teshalex15428	74.16
483	Teshale x22325	62.98	447	Teshale x22325	87	842	Teshalex16173	270.7	484	Teshale x22325	32.36	844	Teshalex16173	74.135
498	Teshale x22325	62.98	448	Teshale x22325	87	860	Teshalex16173	270.7	198	Teshalex10876	32.32	402	Teshalex15428	74.13
545	Teshale x22325	62.98	455	Teshale x22325	87	8	Teshalex14446	270.6	213	Teshalex10876	32.26	599	Teshale x3583	74.13
547	Teshale x22325	62.98	461	Teshale x22325	87	11	Teshalex14446	270.6	693	Teshale x3583	32.25	316	Teshalex15428	74.115
563	Teshale x22325	62.98	467	Teshale x22325	87	29	Teshalex14446	270.6	1095	Teshale x 16044	32.25	459	Teshale x22325	74.11
641	Teshale x3583	62.98	468	Teshale x22325	87	872	Teshalex16173	270.6	739	Teshalex14298	32.22	896	Teshalex16173	74.105
649	Teshale x3583	62.98	472	Teshale x22325	87	1102	Teshale x 16044	270.6	939	Teshalex16173	32.21	104	Teshalex14446	74.055
687	Teshale x3583	62.98	475	Teshale x22325	87	717	Teshalex14298	270.5	190	Teshalex10876	32.2	1062	Teshalex23988	74.05
713	Teshalex14298	62.98	476	Teshale x22325	87	1231	Teshalex 32234	270.5	149	Teshalex14446	32.19	520	Teshale x22325	74.04
732	Teshalex14298	62.98	481	Teshale x22325	87	37	Teshalex14446	270.4	209	Teshalex10876	32.18	586	Teshale x3583	74.04
846	Teshalex16173	62.98	483	Teshale x22325	87	392	Teshalex15428	270.4	546	Teshale x22325	32.13	1075	Teshalex23988	74.04
873	Teshalex16173	62.98	485	Teshale x22325	87	618	Teshale x3583	270.4	765	Teshalex14298	32.1	871	Teshalex16173	74.02
944	Teshalex16173	62.98	487	Teshale x22325	87	1170	Teshalex14556	270.4	233	Teshalex10876	32.07	164	Teshalex10876	73.98
973	Teshalex9911	62.98	490	Teshale x22325	87	780	Teshalex14298	270.4	821	Teshalex14298	32.07	495	Teshale x22325	73.96
1088	Teshalex23988	62.98	492	Teshale x22325	87	730	Teshalex14298	270.2	862	Teshalex16173	32.06	1013	Teshalex9911	73.95
174	Teshalex10876	62.98	493	Teshale x22325	87	349	Teshalex15428	270.2	577	Teshale x3583	32.05	1211	Teshalex2205	73.92
335	Teshalex15428	62.98	494	Teshale x22325	87	967	Teshalex9911	270.1	1033	Teshalex9911	32.03	1186	Teshalex2205	73.86
599	Teshale x3583	62.98	495	Teshale x22325	87	1156	Teshalex14556	270.1	218	Teshalex10876	31.99	899	Teshalex16173	73.855
656	Teshale x3583	62.98	497	Teshale x22325	87	284	Teshalex10876	270	578	Teshale x3583	31.94	366	Teshalex15428	73.845
737	Teshalex14298	62.98	498	Teshale x22325	87	998	Teshalex9911	270	91	Teshalex14446	31.93	842	Teshalex16173	73.845
1046	Teshalex23988	62.98	500	Teshale x22325	87	1206	Teshalex2205	270	777	Teshalex14298	31.93	1067	Teshalex23988	73.83
1055	Teshalex23988	62.98	503	Teshale x22325	87	568	Teshale x22325	269.9	228	Teshalex10876	31.88	534	Teshale x22325	73.795
1116	Teshale x 16044	62.98	505	Teshale x22325	87	757	Teshalex14298	269.9	992	Teshalex9911	31.87	937	Teshalex16173	73.79
625	Teshale x3583	62.97	506	Teshale x22325	87	246	Teshalex10876	269.8	648	Teshale x3583	31.77	953	Teshalex9911	73.785
661	Teshale x3583	62.97	509	Teshale x22325	87	612	Teshale x3583	269.8	1238	Teshalex 32234	31.77	987	Teshalex9911	73.785
912	Teshalex16173	62.97	511	Teshale x22325	87	359	Teshalex15428	269.7	468	Teshale x22325	31.76	4	Teshalex14446	73.775
301	Teshalex15428	62.97	512	Teshale x22325	87	547	Teshale x22325	269.7	1186	Teshalex2205	31.76	259	Teshalex10876	73.775
1155	Teshalex14556	62.97	513	Teshale x22325	87	595	Teshale x3583	269.7	349	Teshalex15428	31.73	1144	Teshalex14556	73.75
408	Teshalex15428	62.95	514	Teshale x22325	87	1095	Teshale x 16044	269.7	93	Teshalex14446	31.73	918	Teshalex16173	73.715
495	Teshale x22325	62.95	515	Teshale x22325	87	1162	Teshalex14556	269.7	310	Teshalex15428	31.73	1203	Teshalex2205	73.69

59	Teshalex14446	62.94	516	Teshale x22325	87	1091	Teshalex23988	269.6	570	Teshale x22325	31.72	856	Teshalex16173	73.68
84	Teshalex14446	62.94	517	Teshale x22325	87	455	Teshale x22325	269.5	327	Teshalex15428	31.7	938	Teshalex16173	73.68
344	Teshalex15428	62.94	519	Teshale x22325	87	971	Teshalex9911	269.5	910	Teshalex16173	31.65	285	Teshalex10876	73.66
833	Teshalex16173	62.94	520	Teshale x22325	87	1229	Teshalex 32234	269.5	1199	Teshalex2205	31.65	275	Teshalex10876	73.64
839	Teshalex16173	62.94	522	Teshale x22325	87	175	Teshalex10876	269.4	1051	Teshalex23988	31.64	594	Teshale x3583	73.615
81	Teshalex14446	62.94	524	Teshale x22325	87	939	Teshalex16173	269.4	1167	Teshalex14556	31.63	722	Teshalex14298	73.61
177	Teshalex10876	62.94	525	Teshale x22325	87	1090	Teshalex23988	269.4	179	Teshalex10876	31.59	272	Teshalex10876	73.595
748	Teshalex14298	62.94	528	Teshale x22325	87	198	Teshalex10876	269.3	129	Teshalex14446	31.58	115	Teshalex14446	73.575
1068	Teshalex23988	62.94	530	Teshale x22325	87	1011	Teshalex9911	269.2	689	Teshale x3583	31.58	276	Teshalex10876	73.575
1095	Teshale x 16044	62.94	531	Teshale x22325	87	15	Teshalex14446	269.1	490	Teshale x22325	31.53	514	Teshale x22325	73.575
222	Teshalex10876	62.93	532	Teshale x22325	87	142	Teshalex14446	269.1	344	Teshalex15428	31.53	1188	Teshalex2205	73.575
470	Teshale x22325	62.93	533	Teshale x22325	87	323	Teshalex15428	269.1	181	Teshalex10876	31.46	805	Teshalex14298	73.565
568	Teshale x22325	62.93	534	Teshale x22325	87	1022	Teshalex9911	269	419	Teshalex15428	31.46	230	Teshalex10876	73.46
570	Teshale x22325	62.93	536	Teshale x22325	87	1144	Teshalex14556	268.9	1077	Teshalex23988	31.46	912	Teshalex16173	73.445
631	Teshale x3583	62.93	539	Teshale x22325	87	377	Teshalex15428	268.7	433	Teshalex15428	31.38	961	Teshalex9911	73.445
674	Teshale x3583	62.93	543	Teshale x22325	87	462	Teshale x22325	268.7	844	Teshalex16173	31.38	1041	Teshalex23988	73.44
714	Teshalex14298	62.93	544	Teshale x22325	87	483	Teshale x22325	268.7	949	Teshalex16173	31.35	1019	Teshalex9911	73.43
782	Teshalex14298	62.93	546	Teshale x22325	87	488	Teshale x22325	268.7	320	Teshalex15428	31.34	1155	Teshalex14556	73.425
796	Teshalex14298	62.93	548	Teshale x22325	87	711	Teshalex14298	268.6	652	Teshale x3583	31.29	578	Teshale x3583	73.415
1004	Teshalex9911	62.93	549	Teshale x22325	87	1158	Teshalex14556	268.5	84	Teshalex14446	31.27	936	Teshalex16173	73.415
1049	Teshalex23988	62.93	560	Teshale x22325	87	48	Teshalex14446	268.4	470	Teshale x22325	31.26	122	Teshalex14446	73.375
1104	Teshale x 16044	62.93	562	Teshale x22325	87	243	Teshalex10876	268.4	271	Teshalex10876	31.25	897	Teshalex16173	73.335
124	Teshalex14446	62.93	563	Teshale x22325	87	77	Teshalex14446	268.3	603	Teshale x3583	31.25	231	Teshalex10876	73.225
291	Teshalex10876	62.93	564	Teshale x22325	87	255	Teshalex10876	268.3	586	Teshale x3583	31.16	1174	Teshalex14556	73.225
356	Teshalex15428	62.93	565	Teshale x22325	87	933	Teshalex16173	268.3	340	Teshalex15428	31.09	964	Teshalex9911	73.22
404	Teshalex15428	62.93	566	Teshale x22325	87	965	Teshalex9911	268.3	283	Teshalex10876	31.02	568	Teshale x22325	73.21
532	Teshale x22325	62.93	567	Teshale x22325	87	490	Teshale x22325	268.2	462	Teshale x22325	30.97	1114	Teshale x 16044	73.21
617	Teshale x3583	62.93	571	Teshale x3583	87	549	Teshale x22325	268.2	1144	Teshalex14556	30.96	528	Teshale x22325	73.2
680	Teshale x3583	62.93	574	Teshale x3583	87	645	Teshale x3583	268.1	342	Teshalex15428	30.95	971	Teshalex9911	73.195
842	Teshalex16173	62.93	580	Teshale x3583	87	902	Teshalex16173	268.1	600	Teshale x3583	30.93	1119	Teshale x 16044	73.17
861	Teshalex16173	62.93	582	Teshale x3583	87	950	Teshalex9911	267.9	712	Teshalex14298	30.91	1216	Teshalex2205	73.14

877	Teshalex16173	62.93	585	Teshale x3583	87	95	Teshalex14446	267.8	748	Teshalex14298	30.89	1161	Teshalex14556	73.12
901	Teshalex16173	62.93	588	Teshale x3583	87	1185	Teshalex2205	267.7	303	Teshalex15428	30.88	38	Teshalex14446	73.115
919	Teshalex16173	62.93	590	Teshale x3583	87	427	Teshalex15428	267.7	471	Teshale x22325	30.86	708	Teshalex14298	73.105
963	Teshalex9911	62.93	591	Teshale x3583	87	44	Teshalex14446	267.6	883	Teshalex16173	30.85	827	Teshalex14298	73.065
968	Teshalex9911	62.93	593	Teshale x3583	87	90	Teshalex14446	267.6	170	Teshalex10876	30.79	1185	Teshalex2205	73.06
1168	Teshalex14556	62.93	594	Teshale x3583	87	231	Teshalex10876	267.5	729	Teshalex14298	30.78	963	Teshalex9911	73.02
172	Teshalex10876	62.92	597	Teshale x3583	87	471	Teshale x22325	267.4	865	Teshalex16173	30.72	315	Teshalex15428	73.015
218	Teshalex10876	62.92	599	Teshale x3583	87	46	Teshalex14446	267.3	96	Teshalex14446	30.69	1187	Teshalex2205	73.01
327	Teshalex15428	62.92	600	Teshale x3583	87	771	Teshalex14298	267.3	316	Teshalex15428	30.68	224	Teshalex10876	73.005
346	Teshalex15428	62.92	601	Teshale x3583	87	476	Teshale x22325	267.3	229	Teshalex10876	30.67	369	Teshalex15428	73
411	Teshalex15428	62.92	605	Teshale x3583	87	847	Teshalex16173	267.2	1249	Teshalex 32234	30.64	171	Teshalex10876	72.98
462	Teshale x22325	62.92	607	Teshale x3583	87	7	Teshalex14446	267.1	852	Teshalex16173	30.63	898	Teshalex16173	72.975
552	Teshale x22325	62.92	610	Teshale x3583	87	229	Teshalex10876	267.1	1145	Teshalex14556	30.63	1029	Teshalex9911	72.97
588	Teshale x3583	62.92	612	Teshale x3583	87	353	Teshalex15428	267.1	538	Teshale x22325	30.52	1000	Teshalex9911	72.965
775	Teshalex14298	62.92	613	Teshale x3583	87	73	Teshalex14446	267	870	Teshalex16173	30.51	464	Teshale x22325	72.96
876	Teshalex16173	62.92	615	Teshale x3583	87	1044	Teshalex23988	267	599	Teshale x3583	30.48	530	Teshale x22325	72.94
920	Teshalex16173	62.92	617	Teshale x3583	87	767	Teshalex14298	266.9	477	Teshale x22325	30.44	1189	Teshalex2205	72.93
938	Teshalex16173	62.92	618	Teshale x3583	87	932	Teshalex16173	266.9	474	Teshale x22325	30.43	213	Teshalex10876	72.92
1164	Teshalex14556	62.92	621	Teshale x3583	87	934	Teshalex16173	266.9	771	Teshalex14298	30.43	375	Teshalex15428	72.895
17	Teshalex14446	62.92	622	Teshale x3583	87	429	Teshalex15428	266.8	148	Teshalex14446	30.43	359	Teshalex15428	72.84
135	Teshalex14446	62.92	623	Teshale x3583	87	128	Teshalex14446	266.7	1198	Teshalex2205	30.42	584	Teshale x3583	72.835
258	Teshalex10876	62.92	625	Teshale x3583	87	835	Teshalex16173	266.6	742	Teshalex14298	30.4	593	Teshale x3583	72.83
349	Teshalex15428	62.92	627	Teshale x3583	87	45	Teshalex14446	266.5	1005	Teshalex9911	30.34	1018	Teshalex9911	72.83
394	Teshalex15428	62.92	628	Teshale x3583	87	75	Teshalex14446	266.3	431	Teshalex15428	30.32	383	Teshalex15428	72.81
419	Teshalex15428	62.92	633	Teshale x3583	87	126	Teshalex14446	266.3	255	Teshalex10876	30.23	1184	Teshalex2205	72.76
484	Teshale x22325	62.92	637	Teshale x3583	87	1166	Teshalex14556	266.3	681	Teshale x3583	30.2	605	Teshale x3583	72.715
486	Teshale x22325	62.92	638	Teshale x3583	87	326	Teshalex15428	266.2	1096	Teshale x 16044	30.16	1034	Teshalex9911	72.685
489	Teshale x22325	62.92	639	Teshale x3583	87	424	Teshalex15428	266.1	1229	Teshalex 32234	30.13	447	Teshale x22325	72.68
528	Teshale x22325	62.92	640	Teshale x3583	87	97	Teshalex14446	266	835	Teshalex16173	30.12	178	Teshalex10876	72.675
558	Teshale x22325	62.92	641	Teshale x3583	87	321	Teshalex15428	266	920	Teshalex16173	30.04	467	Teshale x22325	72.665
756	Teshalex14298	62.92	642	Teshale x3583	87	821	Teshalex14298	266	601	Teshale x3583	30.03	476	Teshale x22325	72.665

776	Teshalex14298	62.92	647	Teshale x3583	87	1160	Teshalex14556	266	425	Teshalex15428	30.03	326	Teshalex15428	72.66
836	Teshalex16173	62.92	649	Teshale x3583	87	1188	Teshalex2205	266	480	Teshale x22325	30.03	866	Teshalex16173	72.615
1016	Teshalex9911	62.92	652	Teshale x3583	87	905	Teshalex16173	265.8	1237	Teshalex 32234	30	97	Teshalex14446	72.61
136	Teshalex14446	62.91	653	Teshale x3583	87	762	Teshalex14298	265.7	936	Teshalex16173	29.96	911	Teshalex16173	72.61
377	Teshalex15428	62.91	655	Teshale x3583	87	926	Teshalex16173	265.7	1014	Teshalex9911	29.95	303	Teshalex15428	72.59
444	Teshale x22325	62.91	656	Teshale x3583	87	1096	Teshale x 16044	265.6	1170	Teshalex14556	29.95	1072	Teshalex23988	72.585
555	Teshale x22325	62.91	657	Teshale x3583	87	241	Teshalex10876	265.5	175	Teshalex10876	29.94	302	Teshalex15428	72.535
562	Teshale x22325	62.91	658	Teshale x3583	87	260	Teshalex10876	265.5	627	Teshale x3583	29.91	319	Teshalex15428	72.52
677	Teshale x3583	62.91	661	Teshale x3583	87	418	Teshalex15428	265.5	279	Teshalex10876	29.89	604	Teshale x3583	72.515
703	Teshalex14298	62.91	664	Teshale x3583	87	546	Teshale x22325	265.5	1052	Teshalex23988	29.89	851	Teshalex16173	72.475
712	Teshalex14298	62.91	666	Teshale x3583	87	548	Teshale x22325	265.5	369	Teshalex15428	29.88	1238	Teshalex 32234	72.415
743	Teshalex14298	62.91	668	Teshale x3583	87	743	Teshalex14298	265.5	908	Teshalex16173	29.78	684	Teshale x3583	72.355
784	Teshalex14298	62.91	669	Teshale x3583	87	1109	Teshale x 16044	265.5	1056	Teshalex23988	29.76	173	Teshalex10876	72.345
817	Teshalex14298	62.91	671	Teshale x3583	87	755	Teshalex14298	265.4	1044	Teshalex23988	29.7	309	Teshalex15428	72.31
828	Teshalex14298	62.91	673	Teshale x3583	87	239	Teshalex10876	265.3	455	Teshale x22325	29.62	832	Teshalex16173	72.305
878	Teshalex16173	62.91	676	Teshale x3583	87	952	Teshalex9911	265.3	98	Teshalex14446	29.62	1205	Teshalex2205	72.285
888	Teshalex16173	62.91	677	Teshale x3583	87	699	Teshalex14298	265.2	514	Teshale x22325	29.57	923	Teshalex16173	72.28
929	Teshalex16173	62.91	680	Teshale x3583	87	993	Teshalex9911	265.2	1116	Teshale x 16044	29.57	618	Teshale x3583	72.245
957	Teshalex9911	62.91	682	Teshale x3583	87	1001	Teshalex9911	265.1	1203	Teshalex2205	29.56	1076	Teshalex23988	72.24
1054	Teshalex23988	62.91	683	Teshale x3583	87	1163	Teshalex14556	265.1	184	Teshalex10876	29.55	667	Teshale x3583	72.23
1128	Teshale x 16044	62.91	686	Teshale x3583	87	558	Teshale x22325	264.9	388	Teshalex15428	29.53	1054	Teshalex23988	72.225
1151	Teshalex14556	62.91	687	Teshale x3583	87	616	Teshale x3583	264.9	89	Teshalex14446	29.52	583	Teshale x3583	72.21
1153	Teshalex14556	62.91	691	Teshale x3583	87	698	Teshalex14298	264.9	1143	Teshalex14556	29.49	519	Teshale x22325	72.195
1207	Teshalex2205	62.91	694	Teshalex14298	87	259	Teshalex10876	264.9	1171	Teshalex14556	29.49	885	Teshalex16173	72.19
197	Teshalex10876	62.91	695	Teshalex14298	87	28	Teshalex14446	264.8	456	Teshale x22325	29.47	1166	Teshalex14556	72.18
202	Teshalex10876	62.91	697	Teshalex14298	87	613	Teshale x3583	264.8	532	Teshale x22325	29.46	1212	Teshalex2205	72.165
325	Teshalex15428	62.91	698	Teshalex14298	87	937	Teshalex16173	264.7	640	Teshale x3583	29.45	1147	Teshalex14556	72.105
369	Teshalex15428	62.91	709	Teshalex14298	87	114	Teshalex14446	264.6	989	Teshalex9911	29.45	477	Teshale x22325	72.1
390	Teshalex15428	62.91	711	Teshalex14298	87	109	Teshalex14446	264.5	534	Teshale x22325	29.43	522	Teshale x22325	72.09
515	Teshale x22325	62.91	712	Teshalex14298	87	1131	Teshale x 16044	264.3	196	Teshalex10876	29.4	1098	Teshale x 16044	72.08
525	Teshale x22325	62.91	718	Teshalex14298	87	196	Teshalex10876	264.2	569	Teshale x22325	29.36	926	Teshalex16173	72.07

551	Teshale x22325	62.91	719	Teshalex14298	87	972	Teshalex9911	264.2	1099	Teshale x 16044	29.36	468	Teshale x22325	72.06
565	Teshale x22325	62.91	720	Teshalex14298	87	1154	Teshalex14556	264.2	758	Teshalex14298	29.32	901	Teshalex16173	72.06
591	Teshale x3583	62.91	722	Teshalex14298	87	449	Teshale x22325	264.1	1039	Teshalex23988	29.29	102	Teshalex14446	72.045
602	Teshale x3583	62.91	723	Teshalex14298	87	649	Teshale x3583	264.1	850	Teshalex16173	29.27	697	Teshalex14298	72
779	Teshalex14298	62.91	726	Teshalex14298	87	820	Teshalex14298	264.1	1047	Teshalex23988	29.19	443	Teshale x22325	71.985
814	Teshalex14298	62.91	729	Teshalex14298	87	189	Teshalex10876	264	508	Teshale x22325	29.18	110	Teshalex14446	71.965
862	Teshalex16173	62.91	730	Teshalex14298	87	103	Teshalex14446	263.9	389	Teshalex15428	29.17	134	Teshalex14446	71.94
865	Teshalex16173	62.91	732	Teshalex14298	87	560	Teshale x22325	263.9	478	Teshale x22325	29.16	1057	Teshalex23988	71.94
1027	Teshalex9911	62.91	734	Teshalex14298	87	605	Teshale x3583	263.9	1098	Teshale x 16044	29.15	1171	Teshalex14556	71.935
1043	Teshalex23988	62.91	735	Teshalex14298	87	1127	Teshale x 16044	263.8	845	Teshalex16173	29.14	129	Teshalex14446	71.925
1089	Teshalex23988	62.91	741	Teshalex14298	87	1161	Teshalex14556	263.7	839	Teshalex16173	29.11	669	Teshale x3583	71.915
1096	Teshale x 16044	62.91	752	Teshalex14298	87	388	Teshalex15428	263.6	1057	Teshalex23988	29.05	836	Teshalex16173	71.88
1264	Check	62.91	753	Teshalex14298	87	716	Teshalex14298	263.6	519	Teshale x22325	29.03	712	Teshalex14298	71.86
56	Teshalex14446	62.9	754	Teshalex14298	87	127	Teshalex14446	263.5	805	Teshalex14298	29.01	833	Teshalex16173	71.835
80	Teshalex14446	62.9	756	Teshalex14298	87	742	Teshalex14298	263.4	927	Teshalex16173	28.97	142	Teshalex14446	71.825
95	Teshalex14446	62.9	758	Teshalex14298	87	133	Teshalex14446	263.4	330	Teshalex15428	28.96	525	Teshale x22325	71.82
188	Teshalex10876	62.9	762	Teshalex14298	87	406	Teshalex15428	263.3	1088	Teshalex23988	28.96	1126	Teshale x 16044	71.79
273	Teshalex10876	62.9	763	Teshalex14298	87	712	Teshalex14298	263.3	288	Teshalex10876	28.94	633	Teshale x3583	71.78
491	Teshale x22325	62.9	764	Teshalex14298	87	795	Teshalex14298	263.2	443	Teshale x22325	28.9	380	Teshalex15428	71.765
573	Teshale x3583	62.9	769	Teshalex14298	87	834	Teshalex16173	263.2	1020	Teshalex9911	28.9	539	Teshale x22325	71.76
582	Teshale x3583	62.9	770	Teshalex14298	87	1213	Teshalex2205	263.2	502	Teshale x22325	28.84	908	Teshalex16173	71.73
589	Teshale x3583	62.9	776	Teshalex14298	87	660	Teshale x3583	263.2	947	Teshalex16173	28.8	606	Teshale x3583	71.68
615	Teshale x3583	62.9	781	Teshalex14298	87	768	Teshalex14298	263.1	721	Teshalex14298	28.77	986	Teshalex9911	71.675
729	Teshalex14298	62.9	786	Teshalex14298	87	955	Teshalex9911	262.9	449	Teshale x22325	28.76	1138	Teshalex14556	71.625
757	Teshalex14298	62.9	795	Teshalex14298	87	1157	Teshalex14556	262.9	965	Teshalex9911	28.74	217	Teshalex10876	71.59
787	Teshalex14298	62.9	796	Teshalex14298	87	327	Teshalex15428	262.7	314	Teshalex15428	28.69	1240	Teshalex 32234	71.575
875	Teshalex16173	62.9	797	Teshalex14298	87	1172	Teshalex14556	262.7	766	Teshalex14298	28.67	1023	Teshalex9911	71.57
1202	Teshalex2205	62.9	798	Teshalex14298	87	166	Teshalex10876	262.6	893	Teshalex16173	28.67	127	Teshalex14446	71.555
76	Teshalex14446	62.9	802	Teshalex14298	87	328	Teshalex15428	262.6	1189	Teshalex2205	28.67	1181	Teshalex2205	71.555
140	Teshalex14446	62.9	804	Teshalex14298	87	106	Teshalex14446	262.5	1091	Teshalex23988	28.65	962	Teshalex9911	71.475
150	Teshalex14446	62.9	807	Teshalex14298	87	576	Teshale x3583	262.5	715	Teshalex14298	28.62	888	Teshalex16173	71.465

151	Teshalex14446	62.9	809	Teshalex14298	87	63	Teshalex14446	262.4	710	Teshalex14298	28.58	541	Teshale x22325	71.425
284	Teshalex10876	62.9	810	Teshalex14298	87	105	Teshalex14446	262.4	846	Teshalex16173	28.58	133	Teshalex14446	71.38
353	Teshalex15428	62.9	812	Teshalex14298	87	586	Teshale x3583	262.4	1024	Teshalex9911	28.58	837	Teshalex16173	71.38
400	Teshalex15428	62.9	815	Teshalex14298	87	684	Teshale x3583	262.4	246	Teshalex10876	28.54	1101	Teshale x 16044	71.35
604	Teshale x3583	62.9	817	Teshalex14298	87	88	Teshalex14446	262.2	584	Teshale x3583	28.51	218	Teshalex10876	71.345
705	Teshalex14298	62.9	821	Teshalex14298	87	883	Teshalex16173	262.2	926	Teshalex16173	28.42	1236	Teshalex 32234	71.345
731	Teshalex14298	62.9	832	Teshalex16173	87	882	Teshalex16173	262.1	1202	Teshalex2205	28.41	954	Teshalex9911	71.29
753	Teshalex14298	62.9	833	Teshalex16173	87	1056	Teshalex23988	261.8	775	Teshalex14298	28.4	370	Teshalex15428	71.26
758	Teshalex14298	62.9	835	Teshalex16173	87	150	Teshalex14446	261.7	385	Teshalex15428	28.39	478	Teshale x22325	71.2
802	Teshalex14298	62.9	836	Teshalex16173	87	252	Teshalex10876	261.7	506	Teshale x22325	28.38	787	Teshalex14298	71.145
1014	Teshalex9911	62.9	837	Teshalex16173	87	868	Teshalex16173	261.7	113	Teshalex14446	28.33	1094	Teshale x 16044	71.075
1023	Teshalex9911	62.9	838	Teshalex16173	87	574	Teshale x3583	261.6	409	Teshalex15428	28.32	113	Teshalex14446	71.05
1135	Teshale x 16044	62.9	839	Teshalex16173	87	844	Teshalex16173	261.6	794	Teshalex14298	28.31	950	Teshalex9911	71.04
1138	Teshalex14556	62.9	845	Teshalex16173	87	798	Teshalex14298	261.5	559	Teshale x22325	28.31	1130	Teshale x 16044	71.03
1139	Teshalex14556	62.9	846	Teshalex16173	87	784	Teshalex14298	261.4	27	Teshalex14446	28.27	485	Teshale x22325	70.995
1147	Teshalex14556	62.9	847	Teshalex16173	87	140	Teshalex14446	261.3	41	Teshalex14446	28.26	1035	Teshalex9911	70.965
1183	Teshalex2205	62.9	849	Teshalex16173	87	766	Teshalex14298	261.3	1080	Teshalex23988	28.23	576	Teshale x3583	70.95
1204	Teshalex2205	62.9	852	Teshalex16173	87	708	Teshalex14298	261	797	Teshalex14298	28.22	532	Teshale x22325	70.915
1212	Teshalex2205	62.9	853	Teshalex16173	87	992	Teshalex9911	261	531	Teshale x22325	28.17	6	Teshalex14446	70.905
1217	Teshalex2205	62.9	858	Teshalex16173	87	408	Teshalex15428	260.8	804	Teshalex14298	28.16	277	Teshalex10876	70.85
1226	Teshalex 32234	62.9	860	Teshalex16173	87	588	Teshale x3583	260.7	847	Teshalex16173	28.14	515	Teshale x22325	70.845
21	Teshalex14446	62.89	861	Teshalex16173	87	715	Teshalex14298	260.6	464	Teshale x22325	28.14	847	Teshalex16173	70.695
74	Teshalex14446	62.89	862	Teshalex16173	87	1024	Teshalex9911	260.5	176	Teshalex10876	28.13	1220	Teshalex 32234	70.68
186	Teshalex10876	62.89	863	Teshalex16173	87	368	Teshalex15428	260.5	768	Teshalex14298	28.13	768	Teshalex14298	70.655
212	Teshalex10876	62.89	864	Teshalex16173	87	589	Teshale x3583	260.4	981	Teshalex9911	27.97	381	Teshalex15428	70.635
220	Teshalex10876	62.89	865	Teshalex16173	87	788	Teshalex14298	260.3	381	Teshalex15428	27.92	1022	Teshalex9911	70.635
229	Teshalex10876	62.89	870	Teshalex16173	87	818	Teshalex14298	260.2	435	Teshalex15428	27.91	1021	Teshalex9911	70.625
298	Teshalex15428	62.89	871	Teshalex16173	87	110	Teshalex14446	260.1	337	Teshalex15428	27.87	462	Teshale x22325	70.58
375	Teshalex15428	62.89	872	Teshalex16173	87	1164	Teshalex14556	260.1	131	Teshalex14446	27.86	674	Teshale x3583	70.56
412	Teshalex15428	62.89	873	Teshalex16173	87	380	Teshalex15428	260	967	Teshalex9911	27.86	219	Teshalex10876	70.52
457	Teshale x22325	62.89	874	Teshalex16173	87	816	Teshalex14298	259.9	230	Teshalex10876	27.77	887	Teshalex16173	70.49

554	Teshale x22325	62.89	878	Teshalex16173	87	763	Teshalex14298	259.8	445	Teshale x22325	27.76	203	Teshalex10876	70.48
581	Teshale x3583	62.89	879	Teshalex16173	87	186	Teshalex10876	259.7	1157	Teshalex14556	27.6	323	Teshalex15428	70.435
596	Teshale x3583	62.89	882	Teshalex16173	87	677	Teshale x3583	259.6	677	Teshale x3583	27.58	1014	Teshalex9911	70.375
643	Teshale x3583	62.89	883	Teshalex16173	87	652	Teshale x3583	259.3	918	Teshalex16173	27.55	850	Teshalex16173	70.31
730	Teshalex14298	62.89	885	Teshalex16173	87	426	Teshalex15428	259.2	1172	Teshalex14556	27.54	493	Teshale x22325	70.23
936	Teshalex16173	62.89	887	Teshalex16173	87	1147	Teshalex14556	259	422	Teshalex15428	27.53	1229	Teshalex 32234	70.225
1030	Teshalex9911	62.89	888	Teshalex16173	87	43	Teshalex14446	258.9	355	Teshalex15428	27.5	324	Teshalex15428	70.215
1040	Teshalex23988	62.89	891	Teshalex16173	87	1076	Teshalex23988	258.6	517	Teshale x22325	27.48	1091	Teshalex23988	70.135
1143	Teshalex14556	62.89	895	Teshalex16173	87	787	Teshalex14298	258.4	581	Teshale x3583	27.43	322	Teshalex15428	69.975
1193	Teshalex2205	62.89	897	Teshalex16173	87	292	Teshalex10876	258.3	103	Teshalex14446	27.41	1026	Teshalex9911	69.865
3	Teshalex14446	62.89	899	Teshalex16173	87	79	Teshalex14446	258	1065	Teshalex23988	27.38	596	Teshale x3583	69.725
18	Teshalex14446	62.89	900	Teshalex16173	87	249	Teshalex10876	257.5	1105	Teshale x 16044	27.33	609	Teshale x3583	69.625
89	Teshalex14446	62.89	901	Teshalex16173	87	367	Teshalex15428	257.5	354	Teshalex15428	27.33	312	Teshalex15428	69.61
99	Teshalex14446	62.89	906	Teshalex16173	87	751	Teshalex14298	257.3	315	Teshalex15428	27.32	538	Teshale x22325	69.585
112	Teshalex14446	62.89	912	Teshalex16173	87	66	Teshalex14446	257.2	937	Teshalex16173	27.31	268	Teshalex10876	69.57
184	Teshalex10876	62.89	915	Teshalex16173	87	898	Teshalex16173	257.2	448	Teshale x22325	27.29	830	Teshalex14298	69.56
271	Teshalex10876	62.89	916	Teshalex16173	87	522	Teshale x22325	257.1	1192	Teshalex2205	27.29	470	Teshale x22325	69.515
276	Teshalex10876	62.89	920	Teshalex16173	87	13	Teshalex14446	256.8	513	Teshale x22325	27.16	1232	Teshalex 32234	69.46
285	Teshalex10876	62.89	922	Teshalex16173	87	171	Teshalex10876	256.7	746	Teshalex14298	27.12	74	Teshalex14446	69.435
288	Teshalex10876	62.89	924	Teshalex16173	87	393	Teshalex15428	256.6	596	Teshale x3583	27.04	106	Teshalex14446	69.42
350	Teshalex15428	62.89	926	Teshalex16173	87	23	Teshalex14446	256.5	1114	Teshale x 16044	27.03	804	Teshalex14298	69.375
459	Teshale x22325	62.89	927	Teshalex16173	87	827	Teshalex14298	256.5	887	Teshalex16173	27.01	581	Teshale x3583	69.285
567	Teshale x22325	62.89	931	Teshalex16173	87	726	Teshalex14298	256.5	604	Teshale x3583	26.97	1156	Teshalex14556	69.215
692	Teshale x3583	62.89	933	Teshalex16173	87	1200	Teshalex2205	256.4	851	Teshalex16173	26.94	972	Teshalex9911	69.18
811	Teshalex14298	62.89	934	Teshalex16173	87	577	Teshale x3583	256.4	674	Teshale x3583	26.91	496	Teshale x22325	69.105
882	Teshalex16173	62.89	936	Teshalex16173	87	752	Teshalex14298	256.2	133	Teshalex14446	26.9	537	Teshale x22325	69.095
922	Teshalex16173	62.89	938	Teshalex16173	87	1007	Teshalex9911	256.2	256	Teshalex10876	26.81	1016	Teshalex9911	68.975
1106	Teshale x 16044	62.89	940	Teshalex16173	87	779	Teshalex14298	256.1	323	Teshalex15428	26.79	241	Teshalex10876	68.9
1166	Teshalex14556	62.89	942	Teshalex16173	87	16	Teshalex14446	256.1	451	Teshale x22325	26.79	1097	Teshale x 16044	68.88
46	Teshalex14446	62.88	944	Teshalex16173	87	285	Teshalex10876	255.8	83	Teshalex14446	26.79	1051	Teshalex23988	68.865
78	Teshalex14446	62.88	946	Teshalex16173	87	573	Teshale x3583	255.8	909	Teshalex16173	26.78	28	Teshalex14446	68.755

122	Teshalex14446	62.88	948	Teshalex16173	87	803	Teshalex14298	255.7	550	Teshale x22325	26.72	570	Teshale x22325	68.735
232	Teshalex10876	62.88	957	Teshalex9911	87	1	Teshalex14446	255.6	338	Teshalex15428	26.69	759	Teshalex14298	68.665
265	Teshalex10876	62.88	963	Teshalex9911	87	1030	Teshalex9911	255.5	837	Teshalex16173	26.69	266	Teshalex10876	68.63
328	Teshalex15428	62.88	964	Teshalex9911	87	22	Teshalex14446	255.4	324	Teshalex15428	26.54	41	Teshalex14446	68.62
482	Teshale x22325	62.88	968	Teshalex9911	87	572	Teshale x3583	255.4	662	Teshale x3583	26.53	740	Teshalex14298	68.535
506	Teshale x22325	62.88	969	Teshalex9911	87	112	Teshalex14446	255.3	1149	Teshalex14556	26.53	799	Teshalex14298	68.525
580	Teshale x3583	62.88	974	Teshalex9911	87	633	Teshale x3583	255.2	105	Teshalex14446	26.51	967	Teshalex9911	68.515
637	Teshale x3583	62.88	980	Teshalex9911	87	84	Teshalex14446	255	895	Teshalex16173	26.48	1044	Teshalex23988	68.51
658	Teshale x3583	62.88	981	Teshalex9911	87	908	Teshalex16173	255	1045	Teshalex23988	26.47	591	Teshale x3583	68.47
746	Teshalex14298	62.88	982	Teshalex9911	87	1171	Teshalex14556	255	1244	Teshalex 32234	26.46	640	Teshale x3583	68.44
761	Teshalex14298	62.88	988	Teshalex9911	87	1070	Teshalex23988	254.9	1166	Teshalex14556	26.45	1180	Teshalex2205	68.365
771	Teshalex14298	62.88	991	Teshalex9911	87	748	Teshalex14298	254.8	498	Teshale x22325	26.39	1214	Teshalex2205	68.225
934	Teshalex16173	62.88	995	Teshalex9911	87	197	Teshalex10876	254.5	418	Teshalex15428	26.29	93	Teshalex14446	68.21
1123	Teshale x 16044	62.88	996	Teshalex9911	87	117	Teshalex14446	254	1214	Teshalex2205	26.22	1127	Teshale x 16044	68.15
1130	Teshale x 16044	62.88	997	Teshalex9911	87	1169	Teshalex14556	254	1037	Teshalex23988	26.19	571	Teshale x3583	68.115
24	Teshalex14446	62.88	998	Teshalex9911	87	348	Teshalex15428	253.9	482	Teshale x22325	26.18	355	Teshalex15428	68.1
28	Teshalex14446	62.88	1001	Teshalex9911	87	691	Teshale x3583	253.6	1205	Teshalex2205	26.04	516	Teshale x22325	68.065
41	Teshalex14446	62.88	1002	Teshalex9911	87	32	Teshalex14446	253.3	934	Teshalex16173	26	572	Teshale x3583	68.005
130	Teshalex14446	62.88	1004	Teshalex9911	87	287	Teshalex10876	253.2	1030	Teshalex9911	25.98	505	Teshale x22325	67.855
203	Teshalex10876	62.88	1005	Teshalex9911	87	738	Teshalex14298	253.2	814	Teshalex14298	25.96	1030	Teshalex9911	67.765
255	Teshalex10876	62.88	1006	Teshalex9911	87	312	Teshalex15428	252.8	866	Teshalex16173	25.88	421	Teshalex15428	67.72
323	Teshalex15428	62.88	1007	Teshalex9911	87	968	Teshalex9911	252.6	1059	Teshalex23988	25.84	1215	Teshalex2205	67.68
383	Teshalex15428	62.88	1008	Teshalex9911	87	319	Teshalex15428	252.5	530	Teshale x22325	25.82	852	Teshalex16173	67.655
405	Teshalex15428	62.88	1009	Teshalex9911	87	1181	Teshalex2205	252.4	1180	Teshalex2205	25.77	845	Teshalex16173	67.505
441	Teshalex15428	62.88	1011	Teshalex9911	87	617	Teshale x3583	252.3	684	Teshale x3583	25.69	1145	Teshalex14556	67.26
450	Teshale x22325	62.88	1013	Teshalex9911	87	988	Teshalex9911	252.2	1127	Teshale x 16044	25.68	406	Teshalex15428	67.195
461	Teshale x22325	62.88	1014	Teshalex9911	87	101	Teshalex14446	252.1	542	Teshale x22325	25.67	66	Teshalex14446	67.165
481	Teshale x22325	62.88	1018	Teshalex9911	87	1178	Teshalex2205	252	663	Teshale x3583	25.66	991	Teshalex9911	67.06
647	Teshale x3583	62.88	1022	Teshalex9911	87	695	Teshalex14298	251.9	695	Teshalex14298	25.65	595	Teshale x3583	67.05
655	Teshale x3583	62.88	1025	Teshalex9911	87	85	Teshalex14446	251.6	505	Teshale x22325	25.63	947	Teshalex16173	67.035
660	Teshale x3583	62.88	1026	Teshalex9911	87	113	Teshalex14446	251.5	1007	Teshalex9911	25.58	1208	Teshalex2205	67.01

849	Teshalex16173	62.88	1035	Teshalex9911	87	315	Teshalex15428	251	341	Teshalex15428	25.57	1004	Teshalex9911	67
926	Teshalex16173	62.88	1037	Teshalex23988	87	1212	Teshalex2205	251	319	Teshalex15428	25.54	1096	Teshale x 16044	66.99
1009	Teshalex9911	62.88	1038	Teshalex23988	87	903	Teshalex16173	250.7	1110	Teshale x 16044	25.52	755	Teshalex14298	66.76
1017	Teshalex9911	62.88	1041	Teshalex23988	87	1152	Teshalex14556	250.2	182	Teshalex10876	25.41	652	Teshale x3583	66.75
1076	Teshalex23988	62.88	1042	Teshalex23988	87	772	Teshalex14298	250.2	406	Teshalex15428	25.34	65	Teshalex14446	66.71
1101	Teshale x 16044	62.88	1043	Teshalex23988	87	192	Teshalex10876	248.6	857	Teshalex16173	25.23	1048	Teshalex23988	66.7
1137	Teshale x 16044	62.88	1044	Teshalex23988	87	1245	Teshalex 32234	248.3	872	Teshalex16173	25.19	176	Teshalex10876	66.69
1157	Teshalex14556	62.88	1045	Teshalex23988	87	25	Teshalex14446	248.2	28	Teshalex14446	25.11	689	Teshale x3583	66.665
9	Teshalex14446	62.87	1051	Teshalex23988	87	1150	Teshalex14556	248.2	1101	Teshale x 16044	25.11	31	Teshalex14446	66.59
142	Teshalex14446	62.87	1052	Teshalex23988	87	1113	Teshale x 16044	248	997	Teshalex9911	25.1	155	Teshalex10876	66.385
161	Teshalex10876	62.87	1055	Teshalex23988	87	567	Teshale x22325	247.6	1188	Teshalex2205	25.04	101	Teshalex14446	66.14
252	Teshalex10876	62.87	1057	Teshalex23988	87	654	Teshale x3583	247.2	1184	Teshalex2205	24.97	1039	Teshalex23988	66.11
278	Teshalex10876	62.87	1058	Teshalex23988	87	435	Teshalex15428	247.1	560	Teshale x22325	24.93	675	Teshale x3583	65.84
340	Teshalex15428	62.87	1063	Teshalex23988	87	494	Teshale x22325	246.8	606	Teshale x3583	24.87	337	Teshalex15428	65.59
355	Teshalex15428	62.87	1064	Teshalex23988	87	1244	Teshalex 32234	245.7	421	Teshalex15428	24.85	246	Teshalex10876	65.56
381	Teshalex15428	62.87	1065	Teshalex23988	87	799	Teshalex14298	244.9	368	Teshalex15428	24.83	341	Teshalex15428	65.525
480	Teshale x22325	62.87	1067	Teshalex23988	87	391	Teshalex15428	244.7	763	Teshalex14298	24.67	909	Teshalex16173	65.475
574	Teshale x3583	62.87	1069	Teshalex23988	87	401	Teshalex15428	244.2	359	Teshalex15428	24.63	452	Teshale x22325	65.435
610	Teshale x3583	62.87	1071	Teshalex23988	87	121	Teshalex14446	243.2	860	Teshalex16173	24.61	474	Teshale x22325	65.395
763	Teshalex14298	62.87	1072	Teshalex23988	87	200	Teshalex10876	243.1	754	Teshalex14298	24.6	73	Teshalex14446	65.36
777	Teshalex14298	62.87	1074	Teshalex23988	87	1013	Teshalex9911	242.7	426	Teshalex15428	24.51	220	Teshalex10876	65.35
795	Teshalex14298	62.87	1075	Teshalex23988	87	662	Teshale x3583	242.4	848	Teshalex16173	24.44	1202	Teshalex2205	65.305
847	Teshalex16173	62.87	1077	Teshalex23988	87	24	Teshalex14446	242.1	507	Teshale x22325	24.35	857	Teshalex16173	65.16
988	Teshalex9911	62.87	1080	Teshalex23988	87	809	Teshalex14298	241.9	903	Teshalex16173	24.31	677	Teshale x3583	65.07
1003	Teshalex9911	62.87	1081	Teshalex23988	87	129	Teshalex14446	241.7	751	Teshalex14298	24.3	190	Teshalex10876	65.015
1034	Teshalex9911	62.87	1087	Teshalex23988	87	694	Teshalex14298	241.5	871	Teshalex16173	24.13	1110	Teshale x 16044	64.99
1094	Teshale x 16044	62.87	1088	Teshalex23988	87	611	Teshale x3583	241.4	597	Teshale x3583	24.12	788	Teshalex14298	64.95
25	Teshalex14446	62.87	1093	Teshale x 16044	87	674	Teshale x3583	241.2	727	Teshalex14298	24	431	Teshalex15428	64.91
26	Teshalex14446	62.87	1094	Teshale x 16044	87	880	Teshalex16173	240.7	755	Teshalex14298	23.92	288	Teshalex10876	64.85
58	Teshalex14446	62.87	1095	Teshale x 16044	87	422	Teshalex15428	240.1	219	Teshalex10876	23.88	860	Teshalex16173	64.825
114	Teshalex14446	62.87	1096	Teshale x 16044	87	1182	Teshalex2205	240	142	Teshalex14446	23.87	1195	Teshalex2205	64.66

159	Teshalex10876	62.87	1101	Teshale x 16044	87	290	Teshalex10876	239.7	162	Teshalex10876	23.87	824	Teshalex14298	64.455
321	Teshalex15428	62.87	1104	Teshale x 16044	87	1195	Teshalex2205	239.6	591	Teshale x3583	23.74	192	Teshalex10876	64.405
407	Teshalex15428	62.87	1106	Teshale x 16044	87	615	Teshale x3583	238.3	1240	Teshalex 32234	23.73	676	Teshale x3583	63.96
478	Teshale x22325	62.87	1119	Teshale x 16044	87	152	Teshalex14446	238.2	463	Teshale x22325	23.72	1099	Teshale x 16044	63.895
561	Teshale x22325	62.87	1122	Teshale x 16044	87	495	Teshale x22325	238.2	1048	Teshalex23988	23.69	446	Teshale x22325	63.765
622	Teshale x3583	62.87	1124	Teshale x 16044	87	580	Teshale x3583	237.8	1212	Teshalex2205	23.53	1020	Teshalex9911	63.64
720	Teshalex14298	62.87	1126	Teshale x 16044	87	843	Teshalex16173	237.7	1241	Teshalex 32234	23.44	435	Teshalex15428	63.51
790	Teshalex14298	62.87	1127	Teshale x 16044	87	651	Teshale x3583	236.9	1076	Teshalex23988	23.42	70	Teshalex14446	63.43
883	Teshalex16173	62.87	1130	Teshale x 16044	87	578	Teshale x3583	236.6	312	Teshalex15428	23.39	650	Teshale x3583	63.38
884	Teshalex16173	62.87	1131	Teshale x 16044	87	812	Teshalex14298	236.6	824	Teshalex14298	23.37	1077	Teshalex23988	62.91
932	Teshalex16173	62.87	1134	Teshale x 16044	87	569	Teshale x22325	236.1	788	Teshalex14298	23.2	934	Teshalex16173	62.825
941	Teshalex16173	62.87	1135	Teshale x 16044	87	643	Teshale x3583	236.1	698	Teshalex14298	23.15	1116	Teshale x 16044	62.745
967	Teshalex9911	62.87	1137	Teshale x 16044	87	594	Teshale x3583	234.9	436	Teshalex15428	23.13	463	Teshale x22325	62.7
1146	Teshalex14556	62.87	1141	Teshalex14556	87	1216	Teshalex2205	234.9	322	Teshalex15428	23.04	981	Teshalex9911	62.565
1185	Teshalex2205	62.87	1142	Teshalex14556	87	100	Teshalex14446	234.7	167	Teshalex10876	23	778	Teshalex14298	62.49
64	Teshalex14446	62.86	1143	Teshalex14556	87	606	Teshale x3583	234.3	1220	Teshalex 32234	22.92	1192	Teshalex2205	62.37
196	Teshalex10876	62.86	1144	Teshalex14556	87	41	Teshalex14446	233.7	178	Teshalex10876	22.75	646	Teshale x3583	62.23
494	Teshale x22325	62.86	1147	Teshalex14556	87	640	Teshale x3583	233.7	1142	Teshalex14556	22.74	683	Teshale x3583	62.18
553	Teshale x22325	62.86	1148	Teshalex14556	87	760	Teshalex14298	233.2	73	Teshalex14446	22.55	636	Teshale x3583	62.165
797	Teshalex14298	62.86	1149	Teshalex14556	87	9	Teshalex14446	232.3	1208	Teshalex2205	22.47	1007	Teshalex9911	61.925
993	Teshalex9911	62.86	1150	Teshalex14556	87	1180	Teshalex2205	232.3	290	Teshalex10876	22.46	997	Teshalex9911	61.835
1162	Teshalex14556	62.86	1151	Teshalex14556	87	639	Teshale x3583	231.7	612	Teshale x3583	22.23	418	Teshalex15428	61.555
1240	Teshalex 32234	62.86	1153	Teshalex14556	87	96	Teshalex14446	231.2	799	Teshalex14298	21.9	580	Teshale x3583	61.49
189	Teshalex10876	62.86	1154	Teshalex14556	87	83	Teshalex14446	230.6	308	Teshalex15428	21.39	793	Teshalex14298	61.475
274	Teshalex10876	62.86	1161	Teshalex14556	87	999	Teshalex9911	230.4	676	Teshale x3583	21.14	848	Teshalex16173	60.545
299	Teshalex15428	62.86	1164	Teshalex14556	87	60	Teshalex14446	230.3	192	Teshalex10876	21.13	1206	Teshalex2205	60.09
721	Teshalex14298	62.86	1165	Teshalex14556	87	1106	Teshale x 16044	227.5	307	Teshalex15428	20.66	290	Teshalex10876	59.86
844	Teshalex16173	62.86	1168	Teshalex14556	87	433	Teshalex15428	224.6	212	Teshalex10876	20.47	1106	Teshale x 16044	59.46
960	Teshalex9911	62.86	1170	Teshalex14556	87	1184	Teshalex2205	224.6	759	Teshalex14298	19.67	108	Teshalex14446	59.34
1231	Teshalex 32234	62.86	1171	Teshalex14556	87	584	Teshale x3583	223.9	580	Teshale x3583	19.44	1080	Teshalex23988	59.085
259	Teshalex10876	62.85	1174	Teshalex14556	87	1065	Teshalex23988	223.9	1195	Teshalex2205	18.85	1088	Teshalex23988	59.035

652	Teshale x3583	62.85	1175	Teshalex14556	87	936	Teshalex16173	223	134	Teshalex14446	18.49	631	Teshale x3583	58.62
666	Teshale x3583	62.85	1181	Teshalex2205	87	598	Teshale x3583	222.2	541	Teshale x22325	18.39	120	Teshalex14446	57.58
681	Teshale x3583	62.85	1183	Teshalex2205	87	1084	Teshalex23988	221.9	772	Teshalex14298	18.39	27	Teshalex14446	57.29
770	Teshalex14298	62.85	1184	Teshalex2205	87	340	Teshalex15428	221.4	572	Teshale x3583	18.38	466	Teshale x22325	56.85
946	Teshalex16173	62.85	1185	Teshalex2205	87	1149	Teshalex14556	221.1	785	Teshalex14298	18.12	544	Teshale x22325	56.41
406	Teshalex15428	62.84	1229	Teshalex 32234	87	591	Teshale x3583	207.3	1083	Teshalex23988	16.25	98	Teshalex14446	55.955
336	Teshalex15428	62.83	1232	Teshalex 32234	87	601	Teshale x3583	205.6	811	Teshalex14298	15.92	760	Teshalex14298	55.94
1199	Teshalex2205	62.83	1235	Teshalex 32234	87	681	Teshale x3583	202.9	741	Teshalex14298	15.76	358	Teshalex15428	54.865
348	Teshalex15428	62.83	1237	Teshalex 32234	87	806	Teshalex14298	202.9	631	Teshale x3583	15.12	699	Teshalex14298	54.66
683	Teshale x3583	62.83	1239	Teshalex 32234	87	599	Teshale x3583	197.9	760	Teshalex14298	14.65	968	Teshalex9911	54.245
726	Teshalex14298	62.83	1240	Teshalex 32234	87	631	Teshale x3583	194.5	793	Teshalex14298	13.89	498	Teshale x22325	53.305
144	Teshalex14446	62.82	1244	Teshalex 32234	87	689	Teshale x3583	194.1	740	Teshalex14298	13.75	182	Teshalex10876	51.635
256	Teshalex10876	62.82	1245	Teshalex 32234	87	676	Teshale x3583	193.5	699	Teshalex14298	11.12	167	Teshalex10876	50.65
476	Teshale x22325	62.81	1246	Teshalex 32234	87	596	Teshale x3583	187.1	466	Teshale x22325	9.035	741	Teshalex14298	48.665
32	Teshalex14446	61.53	1247	Teshalex 32234	87	134	Teshalex14446	174.4	738	Teshalex14298	7.82	738	Teshalex14298	42.1
	Min	61.53			87			174.4			7.82			42.1
	Max	79.03			97.5			350.3			67.47			107.01
	Mean	64.48			91.99			279.7			38.19			76.63
	LSD (1%)	1.43			3.67			3.15			2.21			1.59
	CV	6.29			5.39			31.1			10.19			8.51