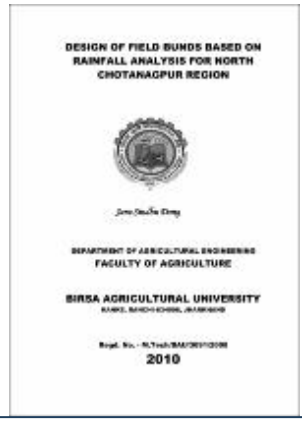
Authors:	Dang, Jane Sindhu (/browse?type=author&value=Dang%2C+Jane+Sindhu)
Advisor:	Rusia, D.K. (/browse?type=author&value=Rusia%2C+D.K.)
Title:	DESIGN OF FIELD BUNDS BASED ON RAINFALL ANALYSIS FOR NORTH CHOTANAGPUR REGION
Publisher:	Birsa Agricultural University, Kanke, Ranchi, Jharkhand
Language:	en_US
Type:	Thesis
Pages:	64
Agrotags:	null
Keywords:	DESIGN OF FIELD BUNDS BASED ON RAINFALL ANALYSIS FOR NORTH CHOTANAGPUR REGION
Abstract:	Rainfall plays a major role in hydrology that finds its greatest applications in the design and operations of water resources, engineering works as well as agricultural systems. Detailed knowledge of rainfall pattern helps in planning crop calendar as well as in designing the different storage structures to meet out irrigation requirement during drought period. Analysis of consecutive days return period is a basic tool for safe and economical planning and design of structural & non-structural measures, small and medium hydraulic structures such as small dams, bridges, culverts, spillways, check dams, ponds, irrigation and drainage channel in watershed management including command area development programmes. Daily rainfall data of 25 years (1982-2006) for North Chotanagpur region were collected to analyze their best fit to four distribution namely Normal distribution, Log Normal, Extreme value type-I and Extreme value type-III. Values were selected from the monsoonal period (standard weeks 22nd–39th). The analysis indicated that the Extreme value type-I distribution gave the closest fit to the observed data and is recommended to annual maximum 1-day rainfall for the design return period. The least value of the Chi- square is taken as the best and values obtained were 0.951mm, 0.985mm, 1.884mm and 0.618mm for Bokaro, Chatra, Koderma and Hazaribag districts respectively. The rainfall data were fitted at 10, 20, 25, and 95 percent probabilities levels. The weekly rainfall data of Bokaro, Chatra, Koderma and Hazaribag district ranges between 7.7mm to 83.5mm, 5.2mm to 67.6mm, 4.7mm to

43.5mm and 5.1mm to 82.6mm respectively. These values are indicating a very large range of fluctuation during the period of study. Drought behavior in terms of normal and drought weeks on weekly basis were determined for all the districts. The study reveals that, the drought was occured in 22nd, 23rd, 38th and in 39th standard weeks. The mean of standard weekly rainfall were found to be 56.5mm, 44.8mm, 31.7mm, 55.3mm and the standard deviation was 19.6mm, 15.6mm, 9.9mm, 19.0mm. Coefficient of variation was found to be minimum in 28th (45.4mm), 29th (87.2mm) 30th (90.5mm)and 31st (68.8mm) week for Bokaro, Chatra, Koderma and Hazaribag respectively and was maximum in 22nd, 23rd,38th,and 39th week. The design of field bund using Extreme value type I distribution, the predicted annual maximum 1 day rainfall for 10, 5, 4, 2 and 1 years return period were obtained for Bokaro (80mm, 75.6mm, 70.1mm, 74.8mm, 55.9mm), for Chatra (65.4mm, 60.6mm, 55.8mm, 59.7mm, 46.1mm), for Koderma (40.5mm, 41.0mm, 33.3mm, 33.9mm, 35.6mm) and for Hazaribag (83.7, 72mm, 75.3mm, 69.0mm, 60.2mm) respectively. These expected 1 day maximum rainfall values for desired return period can be used for designing the bunds. The land situation was considered for design purpose in low land (fine texture soil), mid land (medium texture soil) and in upland (course texture soil) with different land slopes for 1-2%, 2-4% and 4-6%. Runoff was hypothetically assumed that for upland 25%, 35% and 45% of the total rainfall flowed as surface runoff for coarse texture soil. Similarly for mid lands the runoff was assumed to be 30%, 40% and 50% of total rainfall of slope 1-2%, 2-4% and 4-6% constant for low lands 35%, 45% and 55% runoff was assumed for 1-2%, 2-4% and 4-6% respectively. The design parameters like vertical interval, horizontal interval and length of bund depending on the low, medium and heavy rainfall characteristics were also considered. For Bokaro district the design upland the cross section area varies from (0.56 to 0.50 m2) the top width (0.38 to 0.11 m) and bottom width (1.54 to 1.41 m), mid land the cross section area varies from (0.67 to 0.56 m2) the top width (0.57 to 0.10 m) and bottom width (1.73 to 1.50 m) and in low land the cross section area varies from (0.78 to 0.61 m2) the top width (0.76 to 0.14 m) and bottom width (1.92-1.58 m). In upland the cross section area varies from (0.56 to 0.50 m2) the top width (0.38 to 0.11 m) and bottom width (1.54 to 1.41 m), mid land the cross section area varies from (0.67 to 0.56 m2) the top width (0.57 to 0.10 m) and bottom width (1.73 to 1.50 m) and in low land the cross section area varies from (0.78 to 0.61 m2) the top width (0.76 to 0.14 m) and bottom width (1.92-1.58 m) for the Chatra district. Koderma district the different land situation the dimensions of field bunds, in upland the cross section area varies from (0.41 to 0.37 m2) the top width (0.12 to 0.20 m) and bottom width (1.28 to 1.40 m), mid land the cross section area varies from (0.49 to 0.41 m2) the top width (0.26-0.14 m) and bottom width (1.42 to1.48 m) and in low land the cross section area varies from (0.57 to 0.45 m2) the top width (0.40 to 0.14 m) and bottom width (1.56-1.54 m). In upland the cross section area of the Hazaribag district was varies from (0.60 to 0.54 m2) the top width (0.65 to 0.27 m) and bottom width (1.65 to 1.67 m), mid land the cross section area varies from (0.72 to 0.60 m2) the top width (0.89 to 0.15 m) and bottom width (1.89 to1.55 m) and in low land the cross section area varies from (0.84 to 0.66 m2) the top width (0.43 to 0.22 m) and bottom width (1.59 to1.62 m). The predicted rainfall for the desired return period using extreme value type I distribution and consequent estimated runoff can be safely used for designing the bunds.

Description:	DESIGN OF FIELD BUNDS BASED ON RAINFALL ANALYSIS FOR NORTH CHOTANAGPUR REGION
Subject:	Agricultural Engineering
Theme:	DESIGN OF FIELD BUNDS BASED ON RAINFALL ANALYSIS FOR NORTH CHOTANAGPUR REGION
These Type:	M.Tech.
Issue Date:	2010
Appears in Collections:	Thesis (/handle/1/93550)

Files in This Item:

File	Description	Size	Format	
1257 Jane Sindhu Dang.pdf		2.56 MB	Adobe PDF	

View/Open (/displaybitstream?handle=1/5810026644)

Show full item record (/handle/1/5810026644?mode=full) (/handle/1/5810026644/statistics)